

R & C TECHNICAL REPORT:

ROD & *Custom*



STYLED for SPACE
Far-Out 'Forty Tops Show Circuit

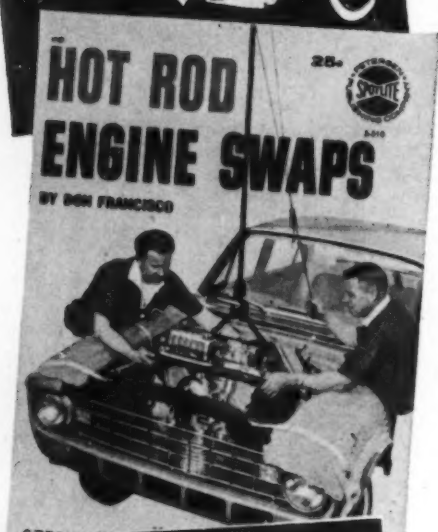
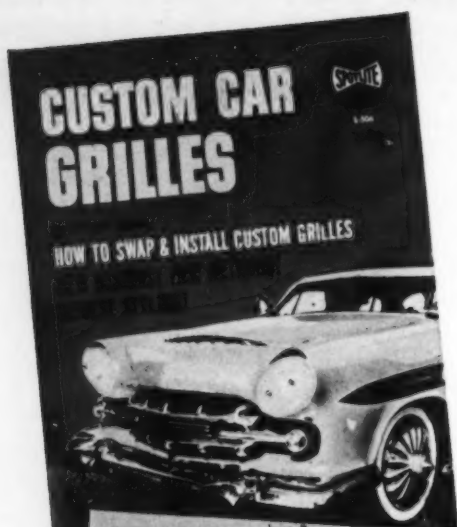


MIDWEST ROD ROUNDUP
Center States' Greatest

TINY BEAR '61 Mini-Bike Races
ACTION PHOTOS AND RESULTS

Sketchpad Restyle & Model Details—
the NEW Lincoln CONTINENTAL





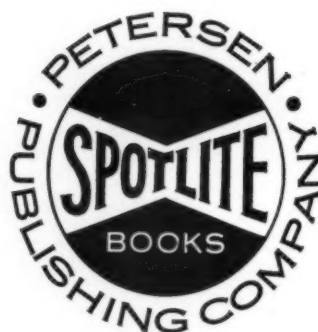
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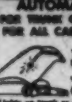


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
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
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
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
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
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
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
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
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
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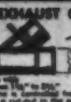
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
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
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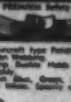
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
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ROD & Custom

seventh issue of our ninth year **NOVEMBER 1961**

Our cover this month pictures one of the most beautiful '40 Ford customs ever to be turned out of a custom shop. The builder is Bill Cushenberry of Cushenberry Custom Shop in Monterey, California. You will notice from the pictures on pages 16-18 the fine workmanship and detail of construction that Bill has put into his outstanding custom. No area has been left untouched, from the custom-built dash and center console to the clean lines of the scooped fenders. Photos by Dave Cunningham.



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19 ELEMENTARY IGNITION ENGINEERING

the first of a three series article on distributor ignition by warren sanborn. part I will cover point operation, the problem of spark ignition, magneto vs. battery, coil design and the functions of the distributor.

30 TINY BEAR '61

tiny bear for '61 turned out to be a real gas and bash aboard the torrid little two wheelers. all that came had a ball, and those that missed this year's event won't want to miss next year's after seeing the fun.

37 INJECTED "A" FREIGHTER

built as a hobby by curly rucker and family, this sharp little "A" hauler is now gathering up lots of show trophies. it's easy to see why as this '29 ford is immaculate down to the last detail.

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THE TINY BEAR RUN for '61 is now history, and the fun-filled day will be long remembered by the competitors on the starting line above. The general lack of helmets and protective clothing identifies this event as the Slow Race, and the mini-bike riders were all too happy to doff their heavy gear in the July heat of the Mojave desert. Rod & Custom was pleased to have been allowed the opportunity of sponsoring this event the past two years, but due to circumstances will have to turn the reins over to someone else for future events. It is our hope that the tradition so eagerly awaited by the fans of tiny two-wheelers may be carried on as in the past and that it will not be allowed to pass on. It's currently up for grabs, so...?

The deft-fingered chap at the right is Bill Sippel, author of our series on electric model racing and owner of AUTO HOBBIES Model Shop in Montrose, California. His precise craftsmanship has been seen in the rod and custom sport for a number of years as a builder of track roadsters, drag jobs and as foreman of the famed Kurtis Kraft shop where he worked on the big Indianapolis cars. Bill's quiet manner and skilled hands have been a most welcome assistance each month.



End-of-an-Era Department. After six years on the R&C staff and a total of some eight years' affiliation with the book, it now becomes necessary to push back this familiar typewriter, straighten up the office to the extent of seeing what the top of the desk looks like again, and strolling out the door toward a new future. Before taking leave, and in the *doubtful* possibility that our paths may never cross again, please accept this personal word of thanks to you, the individual reading these words, for the interest and encouragement shown in the preceding months and years. Whatever changes may result as the reins are handed over to the new staff, for change is always inevitable, we hope that admonitions from past "Starting Lines" and the general vein of editorial thinking will not be forgotten. Far from being an impersonal job, the business of getting out each issue of the magazine has been filled with a sense of responsibility for the sport and each individual connected with it.

Some new material will be forthcoming in future issues, as with the changing of the staff the R&C 'Bird and new roadster projects will no longer be covered within these pages. Perhaps, somewhere, they may turn up again for regular followers.

lynn wineland



ENDSVILLE

if you go for the 'way-out customs, you'll go for R&C, go regularly...

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OUR READERS write or wrong

THREE CHEERS FOR OUR SIDE!

Three cheers for Ben Darb whose letter appeared in the August issue. I have been active in the auto world for several years and I feel the time has come when I must put my two cents in. Last summer I attended the National Custom Car Show at Detroit and I was horrified to find the way in which the cars were judged. I am not blaming the judges or NHRA but the car owners whose cars necessitated this type of judging. The winning custom was far from a piece of integrated, functional, well-proportioned machine. I am not blaming the owner either because he built the car to win shows and he did just that.

The car did not exhibit its trunk or engine. The roof was covered with sculptured material. The sides had areas of white fur and the bottom sides of the body were carried into the show and actually leaned against the car because the car could not possibly move without the body touching the ground. The steering wheel was the same type as a dragster. The actual body work was poor and ripples were evident. For a display, the owner had beautiful girls with pink gowns, pink shoes, pink stockings, pink lipstick and pink HAIR to match the color of the car. I couldn't believe I had come one thousand miles to see that.

There was a car though that made the trip worth while. It was Russell Grady's '57 Olds. The car was definitely a well-designed and well-thought-out machine. It is driven daily and contains a 550 horsepower blown Olds engine which was beautifully shown. The interior was very well done and yet it was also radical. It had conservative pleats yet they were rolled in a concave pattern which I have never seen before. The dash was mahogany and all electrical accessories operated. The trunk was magnificent and contained a working television and a roll-out tool chest and many safety accessories. The seats were swivel but they were functional to sit in. The undercarriage was finished in copper and pearl and the car was displayed on a simple bed of white sand. The color was black and was the best paint finish I saw.

Here we see the difference between a true custom and a show piece. Which won? The less than five thousand dollar collection of gimmicks over the twenty thousand dollars worth of beautiful machine. Even George Barris commented on the absolutely flawless work on the Oriental, but this was still not as great an accomplishment as white fur on the sides of the body.

This to me is a disgusting situation and I feel the only solution is to eliminate the gimmicky objects which gain show points. Forget about non-working phones, angel hair, mirror muffs, cars that have to be assembled on the show floor, and all the other junk.

I contacted Grady and I built a really radical display for the car and we went to the Hartford Autorama where the car had appeared the year before. It walked away with 6 first place trophies including best custom, most popular, etc. Now the problem comes up concerning Indianapolis this year. Do I have to truck a whole pile of garbage fifteen hundred miles to win a car show? In other words, it has gotten to a point where the amount of fountains in a display can win a car show. An inferior car can receive enough points to win just through a radical display and a lot of impractical junk.

My purpose in writing this letter is to try to get something done about this situation and to save the sponsors of the show from the embarrassment of last year. The custom winner has not even appeared in any of the magazines and yet through points it won.

I feel Rod & Custom can help the situation by presenting fine cars and eliminating the "Rick Weird" real cars. Providence, Rhode Island Paul Gomme

● We have felt for a long time that there is something basically wrong with a judging system which allows the gimmick-laden, non-functional cars (?) to win over those with quality craftsmanship. It's true that owners build their cars to win. It wouldn't be long before show cars shaped up as fine automobiles if the judging required it.

A NEW SUBSCRIBER

I am a Rod & Custom fan and have been for some time. I have always enjoyed your magazine and now I enjoy it more because of its size. I have been putting back subscribing for it when it was small, but now I wouldn't miss it for anything. Please send my copy right away!!

Ewell Jones

Salt Lake City, U.

ME, TOO

I'm writing this letter in reference to your August '61 edition. I have been reading your fine magazine for two years now and I don't like people like Mike Norris who criticize your mag. or Roth's cars. People like Mike don't stop to realize all of the trouble your staff goes to to bring ROD & CUSTOM fans interesting information, pictures, and stories of cars.

Now to Roth's car. He probably spent lots of time, money and hard work just to please R&C fans. If this letter is run, it is just to let Roth know that a lot of us are with him all the way.

Eugene Seekins

Salinas, Calif.

ROTH'S DEFENDER

I am writing in reference to a letter from Mike Norris published in the August issue, wherein Mr. Norris described Ed Roth's latest creation, the "Beatnik Bandit", as a "finned, scooped, and scalloped blob of inanimate fiberglass".

I feel this is a false accusation and that Mr. Roth has exercised his talents to achieve a newer and more advanced ideas in the rod and custom field. I believe that Mr. Roth has introduced ideas which will be standard equipment for rods and customs of the future, such as the single control stick, plastic bubble top, aerials extending from the fenders in front and wild paint job.

I am a newcomer to the rod and custom idea, but I believe I know good design when I see it and Roth's "Outlaw" and "Bandit" measure up to my standards. Mr. Roth is to be congratulated for his fine workmanship and advanced design.

Thank you and keep up the fine work at Rod & Custom.

Mike Adkins

St. Albans, W. Va.

DISAGREES 100%

I read in the August issue of R&C a letter from Mike Norris describing Mr. Roth's "Beatnik Bandit" as a "... finned, scooped, and scalloped inanimate metal... glass glob". I think Mr. Roth's Bandit is the wildest hunk of fiberglass I have ever seen. I disagree with Mr. Norris completely, 100%.

Since I am very interested in what Mr. Roth does, I will continue to read R&C as long as it contains information on Mr. Roth.

San Leandro, Calif.

Anonymous

...AND YET ANOTHER!

I've been a steady reader of R&C and I think the "new" mag is great. But there is just one thing that bugs me and that is no fault of yours. That is when a reader writes a letter like that of B. J. McKee, (August). What does he prove by using a whole column of Write - or wrong just to blast Buicks? He could have said it all in three words, I hate Buicks! You'd think he entered a contest - 100 words or less, "What I Have Against Buicks". If everyone who disliked a certain car, and I'm sure nearly everyone does, wrote in with their beefs, R&C would be letters from cover to cover!

Also, I'd like to say I agree completely with Ben Darb's letter of the same issue. What is the sense of building a multi-thousand dollar heap of chrome and plastic if the owner is afraid to use it on the street?

Again, thanks for a great mag.

Milwaukee, Wis.

Walt Marquardt

McKEE'S DILEMMA

In reference to one of the letters in "Readers Write", I would like to correct a statement made by one of your readers. Mr. B. J. McKee and his stock '51 Crosley seemed to have a few figures crossed as far as Tommy Ivo is concerned. First, Ivo holds a creditable 173.74 mph (not 110). Second, he has had an E.T. of 8.69 sec. (this was a record in Sept. of 1960).

Now to say a little more on Buicks. At our strip a blown Buick rail holds the strip record and has dominated blown and injected Chevy's all year. Also, I think everybody has heard of the "Old Yaller" (both I and II). Both of these were Buick-powered sportscars that consistently shut down Ferraris and Maseratis. Now as a final statement I would like to say that as much as I like Buicks, Chevys and Fords, I think it was very cruel to even try to compare a Crosley to a Buick for I have known a stock Buick that has shut down Corvettes and 335 Chevys. By the way, I don't own a Buick.

Rich Stejskal

Omaha, Neb.

AND...

If Mr. McKee checked a little closer, he would find that the '54, '55 and '56 Buick Century with Dynaflo did very good at any drag feast, even the ones in Texas. Kaiser should have kept building ships, not cars. I was under the impression that the '54 Century could handle about anything in its class, and as for his fast Nash of '51, the '51 Olds was no dog.

I have been down to the drags many a time with my 4,500 lbs. of Buick iron and have taken my share of trophies, and have never had to get taken by a Powerglide or Fordomatic! As for Mr. McKee's '51 Crosley station wagon, I should be able to find a '48 Buick with a slush pump somewhere, to blow his Crosley off. I think that the Buick was built for one purpose, but it isn't what Mr. McKee thinks. I think it was built for anyone who wants a safe, dependable automobile. If the newer Buick would put out the options like its smaller brothers and take off a 1,000 lbs., it would also be a treat for any drag.

We enjoy your magazine very much and have had it in our homes for a long time.

Ron Carlin, Bill Lang

Cleveland, O.

MOTORCYCLE MAN

I have enjoyed the various articles on motorcycles in your previous issues, but where are the Triumphs and BSA's? The Triumph and the BSA have always been my favorites. In my opinion they are the best motorcycles made.

I enjoy your magazine very much and I hope you will keep up the good work, especially the cartoons.

Jimmy Lawson

Nashville, Tenn.

NEW YORK AUTO SHOW

We would sincerely appreciate your making mention of the following upcoming auto show in Rod & Custom:

November 10, 11, & 12, '61 - "Utica's Custom Car Review", Utica Memorial Auditorium, Utica, New York; sponsored by Road Aces Auto Club, Inc., produced by National Autorama's, Inc.

For applications or information write: National Autorama's, Inc., P.O. Box 70, Cicero, New York.

National Autorama's, Donald Stacy Inc. Charles McJury

MODEL CLUB

Due to the fact that there has been so much interest in model cars, I am planning to start a club, The Model-of-the-Month Club. This club will have each member buy one model car a month and any information obtained either from the instructions or from car magazines should be sent to me. This information will then be published in a bulletin that each member will receive each month. Membership fee is \$2.00 for one year. Anyone interested in joining should send \$2.00 to Jack Goldstone, 133 Burlington Avenue, Deer Park, New York.

Jack Goldstone

Deer Park, N.Y.

MORE MINI-DRAGS

I have just purchased the August issue of your magazine and think that the new large size is a great improvement, but that isn't what I am writing about. I enjoyed very much the article by Bill Sippel on miniature dragsters and would like very much to see a permanent series in Rod & Custom along these lines.

Benton, Arkansas

Bob Berry

• Thanks, Bob. Your letter is one of many we have received in favor of the electric drag racing. It looks like we will be bringing more of it to you in the magazine. Like... try this issue.

BARGAIN BOX BUYER

Your new large size is great. Also I like the new feature, "Bargain Box". It helps me locate some of the parts I need. Keep those roadsters coming. They are my favorite because I have one ('29 on '32 rails with 283 Corvette engine). Down with customs. I do not enjoy articles like "The Juiciest Car in Town". I think that is just wasting needed space for technical information and pictures. Keep up the otherwise good work!

Craig Wallace

Denver, Colo.

FROM OVERSEAS

I am an Australian reader of ROD & CUSTOM which I try to read every month, but it is sometimes hard to get over here. I am 22 years old and I am just an ordinary truck driver working for a crust and I have little spending money to do major alterations to my Ford, but it has been mildly customised.

I would appreciate it very much if you could get someone to write to me over here. I would really like to have an American friend. My postal address is: Don Thoroughgood, 12 Mount Street, Arncliffe, New South Wales, Australia. Don Thoroughgood

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auto

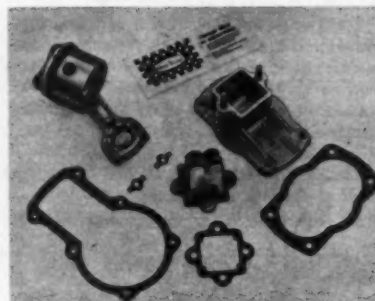


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Roth has laid his airbrush aside long enough
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or one hundred. Polished aluminum is \$3.98
each and polished brass is \$4.98 each. A 10%
discount is also offered on orders of 8 or more.
Write to Roth Studios, Dept. RC-11, 4616 Slauson
Ave., Maywood, Calif.

BUSHING KIT

West Bend Aluminum Company, makers of the
famous West Bend kart engines, announce a
new bushing kit designed to bring karts and
karters out of retirement and back on the track.
The kit, which converts 3-Port 580's to bushing
class specs, costs \$18.00, and includes a new
low-compression piston, aluminum rod with in-
tegral bronze bushings, piston rings, pin and pin
locks, V-reed plate in special manifold and
necessary gaskets for installation. For those
interested in a new bushing engine, there's the
580B for \$78.00. Both the engine and the kit
are approved by all major karting associations
(GKCA, NAKA and GPKCA).

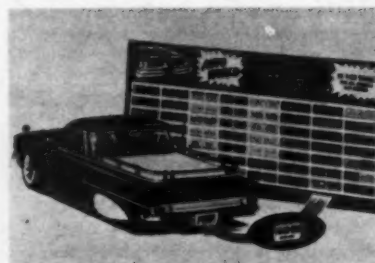


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Formulated for customizers, brush-on 'NameL
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and bronze. Also exotic custom colors of pink,
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primer are now available in wide-top jars. 15¢
at hobby, hardware and paint stores, from the
Custom Paint Specialty line of Pactra Chemical
Co., Los Angeles, Calif.

MODEL CAR LICENSE PLATES

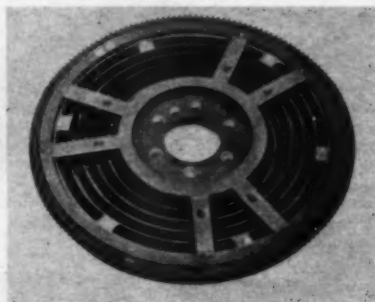
Just the thing to dress up your models, these
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COMPLETE SETS cost only ONE DOLLAR! And
there's a money-back guarantee with 'em, too!
Don't miss this bargain chance to get these
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mart

CUSTOM STEERING WHEELS

These beautiful new wheels are a three spoke modified "Y" design with recessed hub and made of chrome plated steel with a plastic grip. Three sizes are available, 14½", 15½", and 17" with a color choice of black, white or red. Special steering hub kits are also available to adapt to early and late Fords, Chevys and others soon. Prices start at \$16.00. Write to Crogar Equipment Co., Dept. RC, 3663 Gage Ave., Bell, Calif.



ALUMINUM FLYWHEEL

This new product from Howard's Racing Cams is now available for most popular OHV V-8 engines. Flywheel is constructed from 356 heat-treated aluminum and weighs only 12 pounds. This is the lightest flywheel on the market and is also fitted to promote cooler operation. It is designed for all types of competition cars and boats. The price is \$59.00 and is available from Howard's Racing Cams, Dept. RC, 10122 South Main Street, Los Angeles, Calif.

CURVED SUNGLASSES

A new type of featherweight sunglasses with curved lenses will shade the eyes from all directions. These sunglasses are excellent for all types of driving, including sports car events and motorcycling. The price is only \$5.95 and they are available with either smoke or amber lens. To order, write Webco Inc., Dept. RC, 218 Main Street, Venice, Calif.



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For those of you who are still trying to track down that elusive finishing touch for your little jewel, your search is at an end! No longer a rare find, these authentic replacement frames are completely and totally new, available beautifully chromed (\$35.00) or unchromed (\$27.50). Copies are available for '23 to '27 T's, '28 to '31 A's, '32-'36 Fords, roadsters only. These are frames only, no glass, all models in stock except '33-'36, which are special order items. Wind nuts are also available, at \$1.25 each. Ford Parts & Supply Co., 9113 East Garvey, Dept. RC, Rosemead, California.



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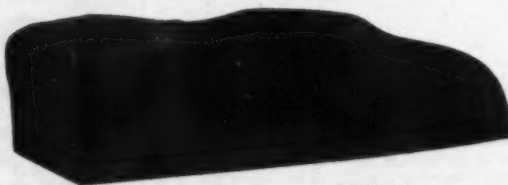


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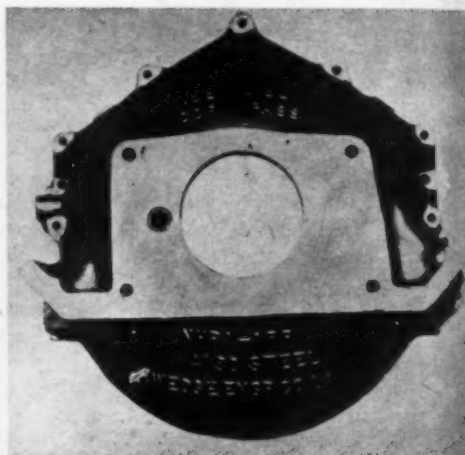
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auto

FM-AM CAR RADIO

A unique new FM-AM — Marine Band automobile radio has been introduced by Metravox Corp. The "Sutton 144" features automatic frequency control, push-pull 10 watt power output for Hi-Fi sound, and compact design measures only 7 3/4" x 3 1/2" x 6 1/2". Also the highly transistorized radio operates on 6 or 12 volt systems, negative or positive polarity. The Metravox "Sutton 144" eliminates "listening fatigue" and brings concert hall realism to the highways. Write to Metravox Corp., Dept. RC, 726 65th Street, Brooklyn 20, N.Y.



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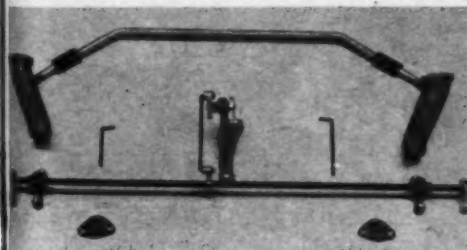


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EXAMPLE

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Mail your rhyme with any part of any LB
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Dept. A, Box 430, Glendale 4, Calif. Contest
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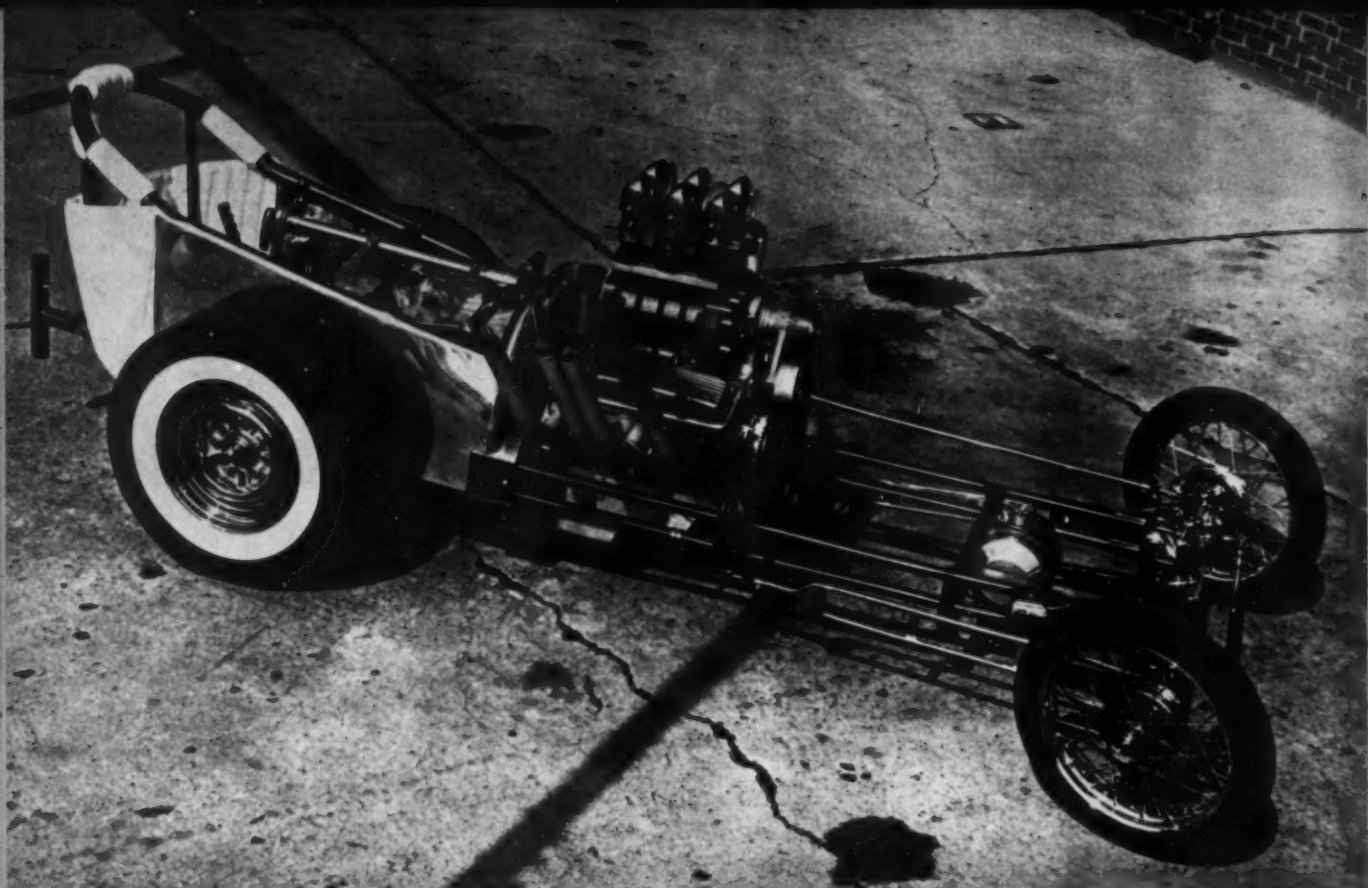
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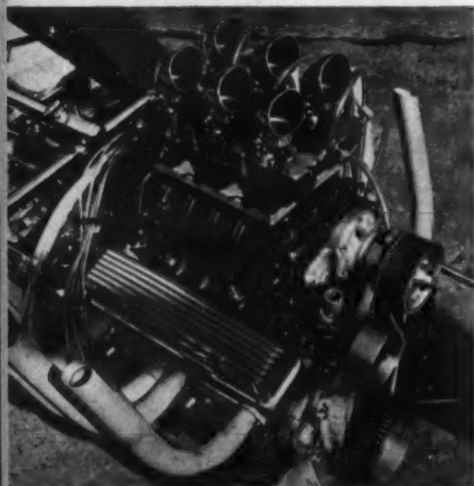
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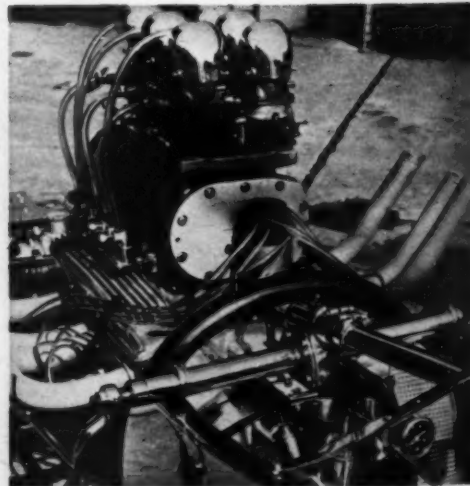
When Bob Frieden of East Cleveland, Ohio decided to build a rail job he decided from the outset that the resulting machine had to be a fine piece of workmanship. But he had a tight budget to go on, so this meant a lot of handcrafting in departments where others might buy their parts over the counter. The ultra lightweight rails supporting the blown Chevrolet mill are double one-inch tubes welded parallel in "bed rail" fashion, gusseted at all strategic points. Body panels are of polished aluminum, adding more highlights to the already abundant display of chrome. Roll bar cage surrounding driver's cockpit is of $1\frac{1}{2}$ " tubing, features head pads at sides, rear for added driver protection. Bob, who is a body man in his regular trade, received an assist from Bryan Shark of Columbus, Ohio in the construction of the dragster. Davis Auto Body, also of Cleveland, is responsible for the Candy Red Metalflake paint.

HANDMADE HUSTLER

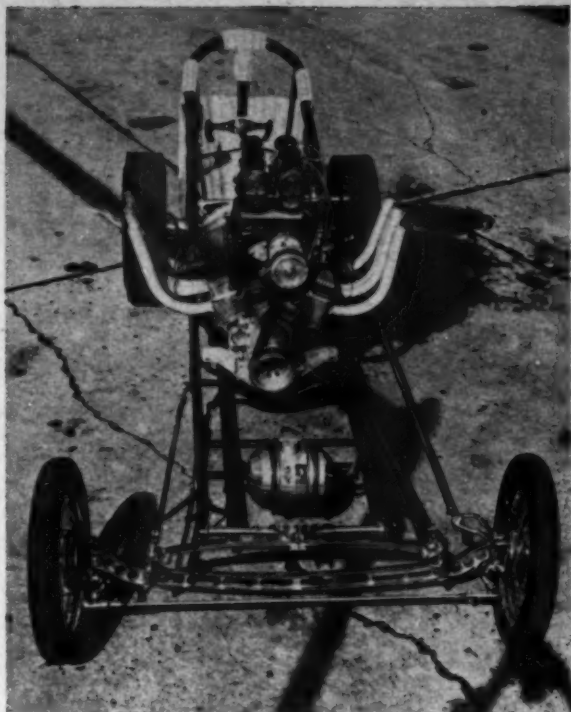
chevy rail hails from cleveland



Right. Joe Hunt Scintilla Vertex magneto provides the needed spark to make Frieden's handmade hustler come alive. The mag advance curve has been reworked from stock and the blower has had additional clearances added for safety. Steering gear is from '32 Ford, has been modified for center steering, completely chrome plated. Work is flawless.



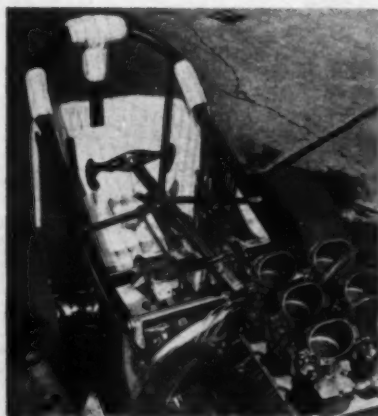
Left. '35 Chev block still runs stock 265 cubic inches, mounts 471 GMC blower and 6 Stromberg carbs. Blower drive is by Cragar, features Gilmer belt. Other modifications include: boxed Chev rods, enlarged intake and exhaust ports, Isky cam, Mickey Thompson forged aluminum pistons, 8:1 compression ratio, tuned exhaust header system.



Front-end assembly previously found its home under a '32 Ford, now has received the lightening treatment via many holes, does its job on the Frieden dragster. Spindles have been reversed, positioning tie-rod in front of axle. Fuel tank is Eeslco unit.



With all the chrome surrounded by polished aluminum body panels, the cockpit is one big dazzling cavity. Gear box is '39 Ford, works through an 11" Bld clutch and Scheffer aluminum flywheel. Narrowed Ford rear end is fitted with husky '53 Lincoln binders.



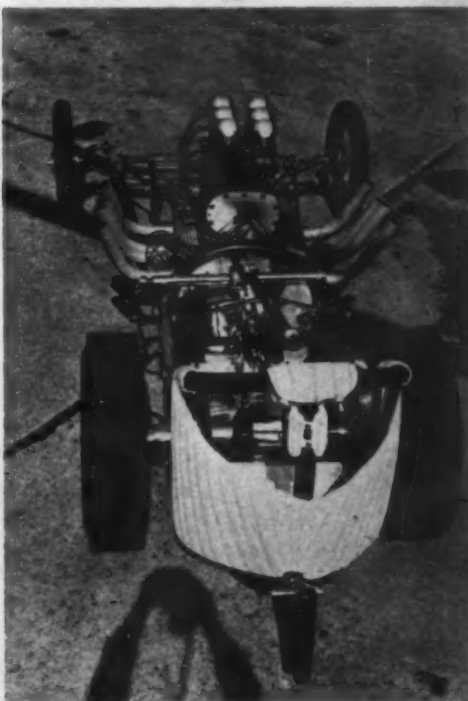
Deluxe upholstery job of pleated white Naugahyde is handiwork of local Sure Fit Upholstery Shop. Interior, exterior and the roll bar cage adjacent to driver's head are all padded. Bob spent one year constructing his rail job at an outlay of about \$1200.

Right. Rear tread has been narrowed sufficiently on the Frieden machine to allow a better bite from the Bruce slicks. Wheelbase is 101 inches while front tread remains stock. Chromed rear wheels are from a '49 Lincoln while front units are '45 Harleys.



Harley-Davidson motorcycle wheels were re-worked to fit '32 Ford spindles. Tires are English Avon cycle type. Handmade friction shocks help support center-mounted 4-leaf spring, lightened axle. Just finished when pictures were taken, car had not been run.

photos by bob hegge



a careful scrutiny of cushenberry's
'forty coupe may reveal some
part that is . . .

**ROD &
Custom
COVERAge**

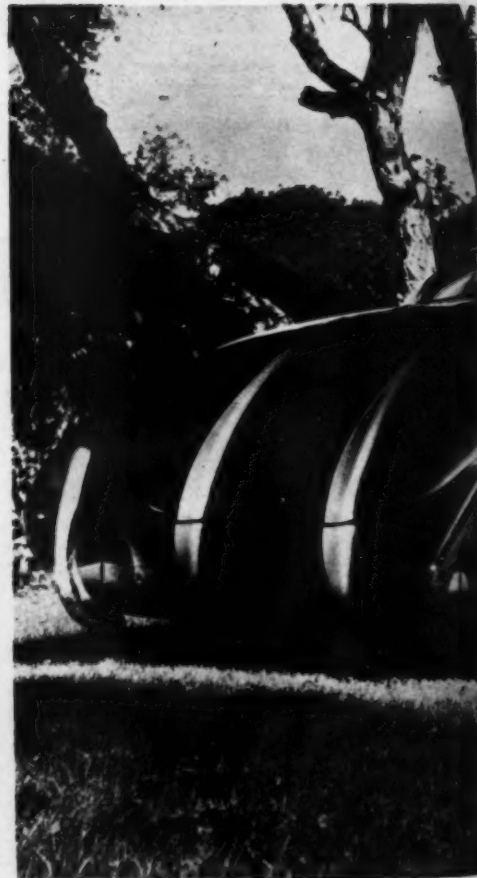
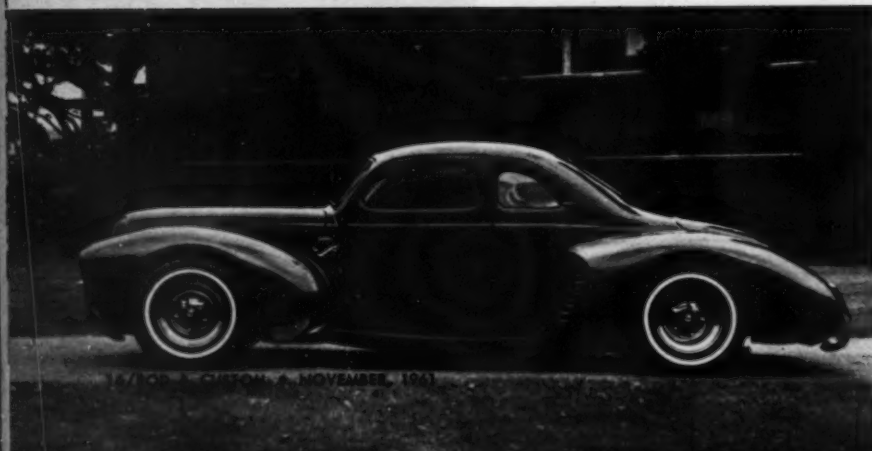
ALMOST STOCK



About the only way to find something stock on Bill Cushenberry's '40 Ford coupe is to look underneath at the frame. Bill, known in Wichita, Kansas for his Kansas Custom Shop, moved to Monterey, California three years ago and owns the Cushenberry Custom Shop there. He figured the best way to advertise the new shop was to build an example of his work. Naturally, it should be "far out" so people would recognize it wherever it went. The result is this one-of-a-kind, modernistic rolling advertisement. Known as the "Matador", the car draws crowds at every place it goes. Judges have awarded it the big Sweepstakes trophy at nearly every showing. As a result, the shop in Monterey is well known.

Customizing didn't stop with just the body for under the hood is found an Olds V8. Along with the usual cleanliness and brightwork is found a new firewall and terrycloth inside the hood.

Full side view reveals very low silhouette and accent on open wheels. $3\frac{1}{2}$ inch top chop with $4\frac{1}{2}$ inch body section seems to retain proportion but car then looks much longer than stock.

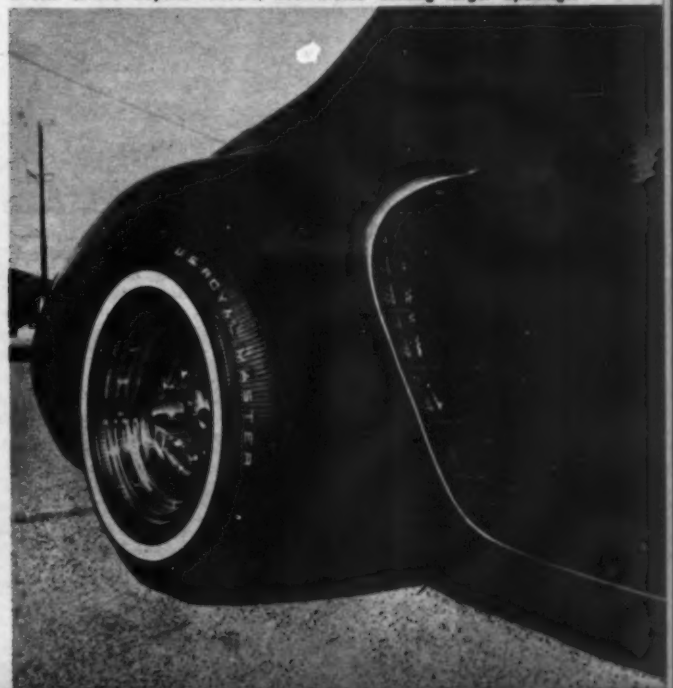




Frontal appearance is radically changed with only the shape of the hood as a hint of its origin. Quad Lucas headlights are placed in extended fenders. Oval tubes with radiused ends mount on expanded metal for 3-dimensional grille. The grille shell was all hand formed.

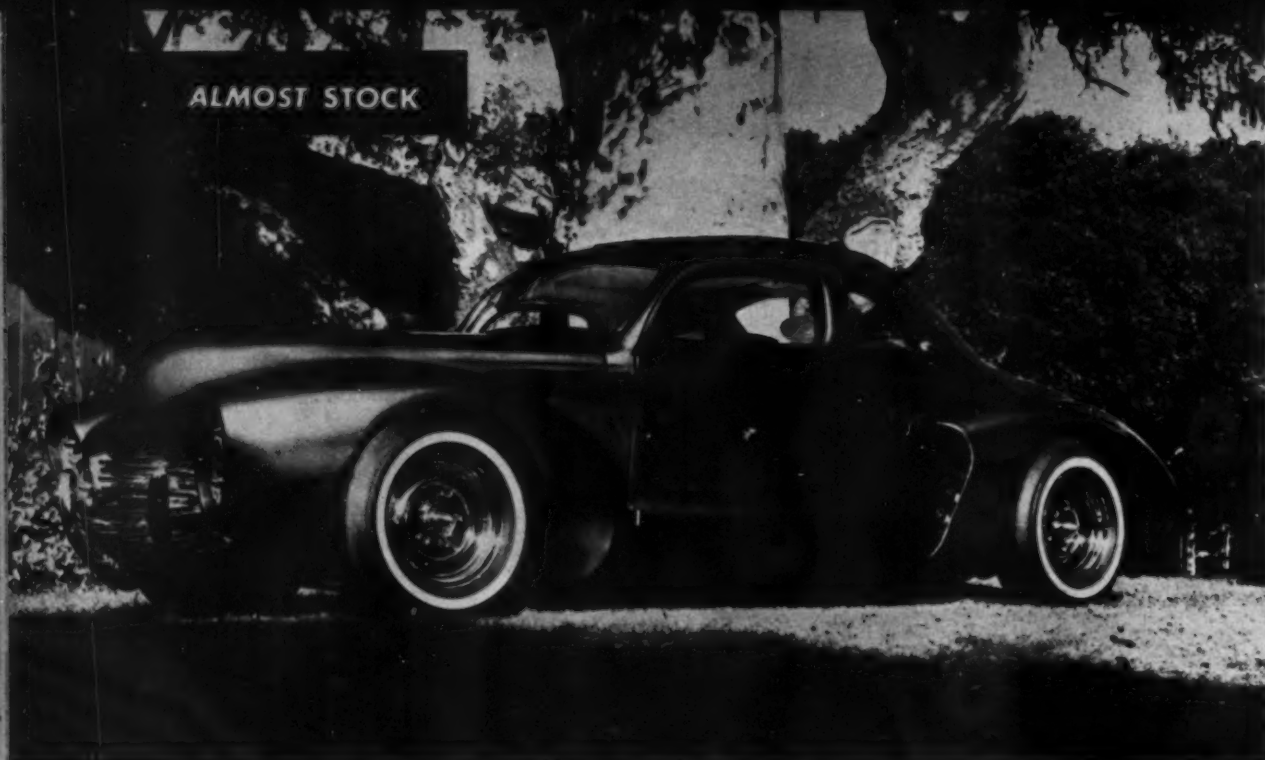
Rear end of the "Matador" received the full treatment also. Large rear window is a vast improvement over stock. Twin body lines on deck also follow onto the top. Taillights are special. Air outlets on the fenders are an unusual styling item. Nerf bars are from Corvette.

Running boards have been removed and sheet metal "step" faired into the rear fender and air scoop. Scoop grille matches the radiator grille. All seams have been filled including fenders to body. Deeply reversed wheels extend beyond fenders, necessitated making larger openings.



photos by dave cunningham

ALMOST STOCK



Interior of the car has novel innovations as well as the car's exterior. Headrests mounted on pleated package tray are pleated, padded and shells are painted to match body. Pearl Naugahyde material is used throughout. Flat headliner has lengthwise pleats as do the car's doors.



Dash was built from DeSoto parts and sheet metal. Steering is also from DeSoto and carries abbreviated wheel. Speedometer is housed in console built out in center. Gearshift lever is in convenient position between the bucket seats. One-piece windshield is from Studebaker.

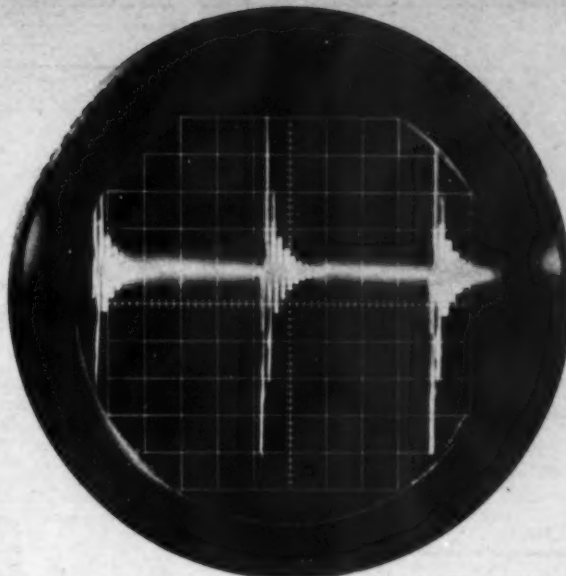


Much like the car's front view, only recognizable body line left is the shape of the trunk lid. While chopping the top, Bill also chopped some 2 inches out of the turret part, making it appear lower and flatter.

Some hint of the car's most unusual point job is given in the full side view of the car. Basically a translucent red, the center of the hood, top and deck and sides and fenders have a lighter, amber to gold effect added. Bill reports that the most difficult parts to work include the rocker panels, the dash and window moldings and the headlight and grille area. Chromed wheels have open styling, but lugs and axle ends are covered with special caps. Slightly unusual is the flowing curve instead of the straight line which is used at the bottom of body between fenders. Trunk has been upholstered with rug and Naugahyde.



Photos by pot broiler



Since the conventional V8 ignition system behaves, as shown by the above oscilloscope photos only at engine speeds below 2000 rpm expected operation is most always degraded. After finishing the article compare these current rise and voltage output recordings (which are maximum values and to the same scale factor) with those appropriate to the context.

ELEMENTARY IGNITION ENGINEERING

for the performance-minded layman

BY WARREN SANBORN

¹Benjamin F. Bailey, *Underlying Principles of Electrical Ignition*, Society of Automotive Engineers, June 1921.

YEARS AGO THE AUTOMOBILE and its operating characteristics presented some formidable engineering challenges. Now, in the age of space, the role of the passenger car has been reduced to that of an appliance, a virtual necessity; only a handful of dedicated organizations, mostly in the racing fraternity, are presently engaged in serious automotive engineering.

During 1921 the SAE Journal (Society of Automotive Engineers) presented an article by a Professor Benjamin F. Bailey¹ which dealt at great length with the principles of electrical ignition. Then, as now, the problem was that of finding the best method for igniting the fuel-air charge. Aside from deducing that there was no difference between

battery or magneto ignition, Professor Bailey presented a rather clever analogy in an attempt to determine whether there should be an optimum form for spark delivery. Once it was established that there would be a spark produced at precisely the correct time, the question was what type of spark would be best: a short fat one, a long narrow one, two successive sparks, or just what. Since the fuel-air charge is a combustible quantity, one may liken it to a sheet of paper. The burning of the fuel-air charge shall then be analogous to the burning of the paper sheet. Just as the point of ignition by the plug is fixed by its location in the cylinder head, the point of ignition of the sheet of paper may be fixed—choose one corner. In order that the analogy hold it shall be specified that only the tip of the corner need be ignited and that a system is

The information to be presented in this three-part series is a direct result of questions constantly submitted to the author and of independent research into the area of spark ignition. Whether an enthusiast, a competitor, or just an interested reader you are invited to explore the hidden and little exposed facets of the automotive ignition system. First to be presented in the series will be the stock, single point, production ignition system; second will be the modification of these and currently available specially designed units; and finally for those who have followed the first two, a discussion of ignition systems for the future. Plainly the information, data, and figures to be presented will serve as an accurate and factual reference for present and future use. You, the readers, are the real author of these articles; it is for your benefit that time will be taken to cover the entire field and present the data in a digestible form.

available which will definitely produce this ignition. Once this condition has been established several facts become clear. Since the ignition system will positively ignite the corner, supplying more energy will not produce any faster burning of the entire sheet. Remember, only the corner may be ignited. Whether one match or ten or one with an extra long stem is used the time required for the sheet to completely burn is independent of the source once the corner has been lit. Likewise if the corner is again ignited after burning has once started nothing will be achieved; burned paper will not re-ignite. Once a spark gap has been selected, one which is not too close so as to induce carbon fouling, complete combustion depends only on the appearance of a spark across the electrode gap. As with the sheet of

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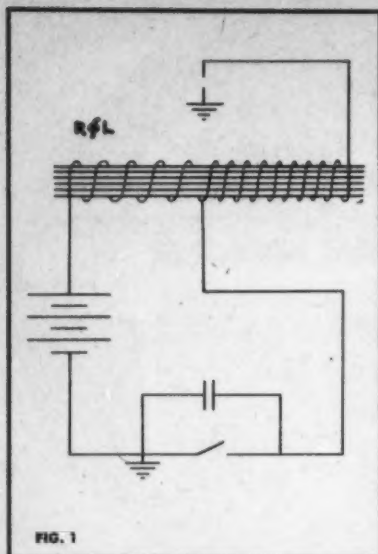


FIG. 1

ELEMENTARY IGNITION ENGINEERING

continued

paper, multiple ignition, analogous to say lighting all four corners, will produce more rapid burning times effectively reducing the spark advance requirement. In certain instances where in the combustion chamber is large in volume, multiple ignition is essential if efficient burning is to result. Reciprocating aircraft engines fall into such a category. The use of multiple ignition commonly found on European racing engines may have been started more out of reliability demands than for horsepower increases.

In the previous discussion it has been assumed that a spark would be produced when it was required. But what if this ability is somehow lost? What factors contribute to this unsatisfactory condition? Systematically each element in the ignition train shall be dissected and analyzed to determine its effect on spark production.

The appearance of a spark across an electrode gap represents a release of energy: to get energy out of a system there must be an energy input to the system. In the conventional ignition a battery provides the energy source. To operate a magneto energy must be taken from the engine itself. Both systems utilize the same device for the momentary storage of energy—the coil. Assuming the coil is representative of one which would be found under the hood of a production automobile the question to ask is how may its performance be predicted. Since the units of energy in electrical terms are volts \times amperes \times time the above question is answered—one must examine the flow of current with time. Figure 1 shows the usual ignition circuit in simplified form and yields as a solution for the current flow, i , with time, t , (letting the time be zero when the switch is closed) $i = \frac{E}{R}$

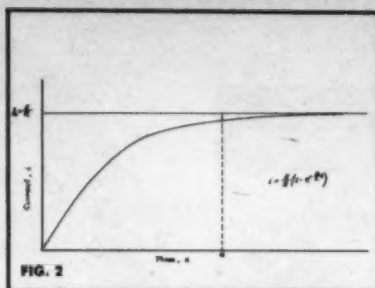


FIG. 2

Figure 1. The usual representation of the conventional ignition circuit. Of importance to the circuit equation of Figure 2 are the battery voltage E , the coil inductance L (excluding mutual inductance), and the coil resistance R (includes fixed resistor).

Figure 3. The relationship between coil output voltage and voltage required for ignition. Point a is that point where ignition becomes questionable; above this point engine operation is impossible.

$(1 - e^{-\frac{R}{L}t})$. Here E is the battery voltage, R is the total resistance (coil + fixed resistor), L is the inductance of the coil, and e is the constant 2.718. Another way to express the inductance is $L = \frac{N\phi}{i}$, where N is the number of turns of wire in the primary winding, ϕ is a quantity called magnetic flux, and i is the current. The expression for current flow with time is now $i = \frac{E}{R} (1 - e^{-\frac{R}{N\phi}t})$. It is not necessary that you thoroughly understand the derivation of this expression; what is important is that you accept its validity. As you shall soon see the performance of your entire ignition system is indirectly related to this equation. To be absolutely thorough one must consider the variation of ϕ with i , but since the effect is to decrease coil performance, ignoring this variation will yield results which are better than actually encountered.

Of particular interest at this point is the shape of the curve relating current flow with time and the time required for i to reach nearly 100% of its final value. Reference to the curve of Figure 2 will clarify these two points. First, one notes that when $t = \frac{0}{6}$ there is no current flowing through the coil and hence no energy storage. Second, when t is large, say greater than point a , the current has reached a nearly constant value meaning that the stored energy is at its maximum value. What is the length of time at point a ? Ten seconds; one second? Unfortunately for your ignition system the time is extremely small—on the order of 0.0005 seconds. To gain an idea of the relationship of this time interval to one second consider letting one second be represented by one mile; the interval in question would then be approximately 26.5 feet. The importance of this fact becomes clear when one realizes that a stock, single point, eight cylinder distributor provides less than

Figure 2. A graphic representation of the equation $i = \frac{E}{R} (1 - e^{-\frac{R}{L}t})$. Point a indicates the approximate time for the current to reach 96% of its maximum value.

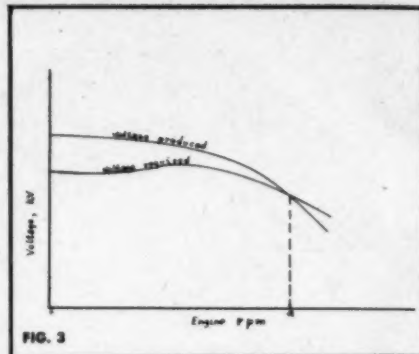


FIG. 3

this time at any rpm past 2000. Translating this information into terms of coil performance means that at any engine speed over 2000 rpm the coil output voltage will be less than maximum. In your favor, however, is the fact that the voltage required for ignition decreases with increasing engine speed. Where the coil output voltage is less than that required for ignition, point a (Figure 3) depends on several factors such as compression ratio, cam design, weight of car, etc. Generally speaking the rpm limit for the above mentioned system lies between 5000 and 6000.

If you have been carefully following the previous discussion, the importance of the device controlling the current flow into the coil comes more clearly into focus. Any disturbance in the operation of the breaker points should naturally be of serious concern.

Affecting the life of a set of breaker points are five factors: 1. The arcing which occurs as the points are opened; 2. The current carried at the time of opening; 3. The arcing due to the back voltage generated in the coil's primary winding; 4. The rate of rubbing block wear; and 5. The contamination of the contact faces by dirt and oil. Direct experimentation indicates that, considering the points in their environmental mounting, factor five is the most serious. If the distributor is clean and oil-free only the first four factors are of major importance.

Consider now a set of breaker points, operating in a clean uncontaminated environment, which have been properly adjusted, say with a 0.018 inch gap. As the points are opened the resulting arc melts a minute volume of the contact face metal which is transferred to the negative contact. Simultaneously the coil's magnetic field begins to collapse generating voltages in both the secondary and primary windings. Of interest in relation to contact erosion is the back voltage or that generated in the primary winding. Although one of the functions of the condenser is to limit

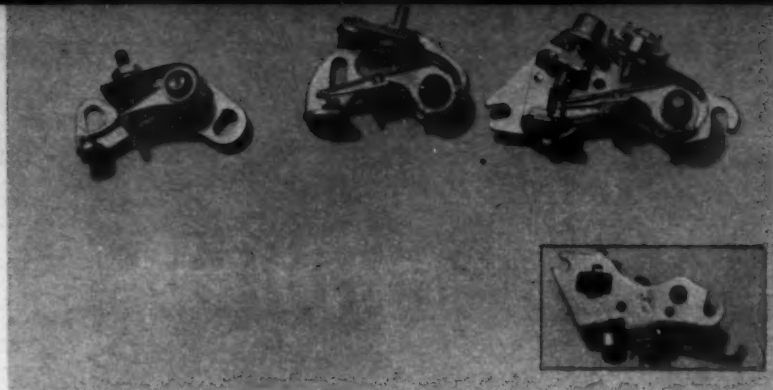


FIG. 4



FIG. 5

Figure 4. Shown here the three types of breaker points common to stock distributors. Note the spring (seen in the bottom view) which holds the point plate snugly to the mounting plate of the late model Delco unit.

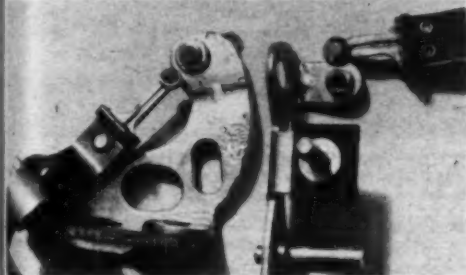


FIG. 6

Figure 6. Comparative wear as produced by approximately 4000 miles of normal driving. The contact faces of the Delco point, left, show initial formation of a metallic spike while the Ford contacts, right, show only a smooth continuous wear pattern.



FIG. 7

Figure 7. An oscilloscope trace showing the current flow through the ignition circuit. At the bottom of the current rise trace and extending to the left is the oscillation due to the condenser.

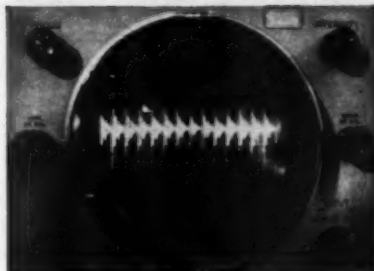


FIG. 8

Figure 8. Coil output voltage as recorded by the oscilloscope. Note that all the voltage peaks are of the same height (maximum voltages are read below the reference line).

Figure 9. Initial bounce as displayed by the stroboscope. The bounce is seen to last for approximately three degrees. With reference to the article, the three point sets mounted in their distributors, produced this pattern of the following rpm's: Ford 4400, early Delco 5200, late Delco 5600.



FIG. 9

the back voltage arcing across the open contacts, total elimination is not desirable because transfer of contact face material is now in the positive direction. Hence by properly selecting the condenser capacity the net metal transfer may be kept within acceptable limits. Variance of engine speeds, temperature and humidity changes, rubbing block wear, and contamination of the contact faces all operate to upset the balance and force the eventual formation of a metallic spike on one of the contact faces.

In the conventional eight cylinder ignition an equal number of sparks must be produced per distributor rotation. Hence if no time were allowed for coil discharge, 45 degrees of arc (which may be converted to time) could be utilized for current flow into the coil. Since it takes time for a coil to discharge (five degrees is sufficient), and since a switch cannot be instantaneously operated, a compromise must be made between providing the greatest possible time for current flow while providing for smooth breaker point operation. Fifteen degrees is approximately the minimum arc within which a set of con-

tacts may be opened 0.018 inches and then closed. The resulting 30 degrees of arc during which the points are closed (designated as dwell time) is that usually associated with the conventional eight cylinder ignition system.

While stock breaker point operation below 5000 engine rpm is relatively simple, attempting to exceed this figure generally results in ignition failure. Above this rpm the coil itself is perhaps capable of supplying a sufficient spark for ignition, but point bounce is now the critical problem.

Experiments with breaker points indicate that bounce is primarily a function of their physical construction (i.e., weight and rigidity of the movable arm, rigidity of the fixed contact, and spring tension) while breaker lobe design is only of minor importance. With few exceptions all breaker points tested by the author have shown a definite tend-

ency to bounce in the 5000 to 6000 engine rpm range. Sometimes point performance can be improved by the addition of heavier spring pressure. Experimental data indicates that 29 to 31 oz. of spring force at the contacts gives optimum operation. Stock spring force is approximately 22 ounces.

Since the effectiveness of your ignition system above 5000 rpm is dependent upon smooth point operation it will be well worth while spending some time and detail on this subject. Figure 4 shows three breaker point sets which are typical of those found in today's distributors. Respectively the sets are as follows: late-model Ford, early Delco, and the 1955 and later Delco. For the stroboscope pattern of these points being operated by distributors designed for their use focus your attention to Figure 5. In each case the normal point

continued on following page



Figure 10. Although the current trace is blurred due to the time exposure the rise and break may be seen. The average pattern is indicated for reference.

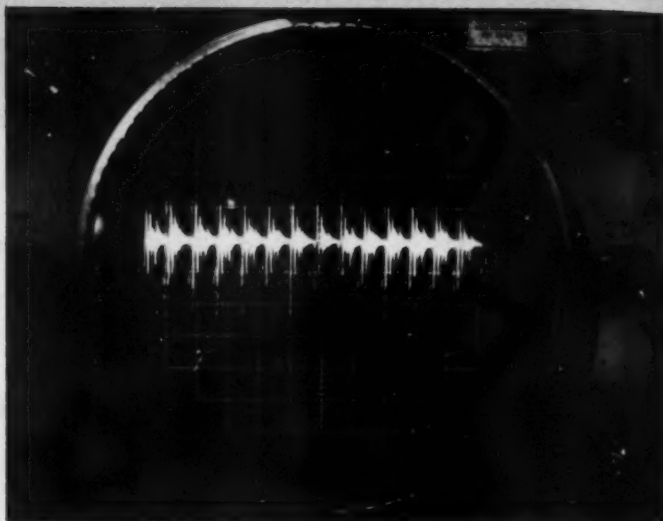


Figure 11. Secondary winding voltage recorded during the initial bounce condition. Note that all the voltage spikes are not the same height due to the irregular current rise through the primary winding.

ELEMENTARY IGNITION ENGINEERING

continued

pattern is shown at 3000 engine rpm. Proper action is indicated by the dark arc when the points open and the illuminated arc will begin to show dark lines where none should be seen. By 6000 engine rpm the bounce condition will be fully developed as indicated by the pattern shown in the appropriately labeled figure.

By merely observing the physical construction of the three test point sets several conclusions may be drawn. The Ford point, typical also of Chrysler and Studebaker, is a rugged unit and will give long efficient life. However due to the heavier point arm, bounce will develop at an earlier rpm than that expected by its counter-part Delco unit. Comparative life figures for the Ford and Delco points will favor the former.

Some twenty years ago experiments with contact configuration were conducted in an effort to determine what factors affect their operating life. When one of the contact faces was contoured, point life showed an improvement over that exhibited by flat faces. By cutting a small cross into the face of the fixed contact (the effect was that of making four equal pie-shaped sectors) point life was even further increased. It was found that formation of the familiar spike was suppressed until all four sectors had been eroded. The following explanation will serve to satisfy this phenomena. First, two things were achieved by radiusing one of the contacts: better surface film penetration resulted and a definite contact area was

provided. Since the flow of current will always take the path of least resistance, the small contact area between the radiused and the flat contact becomes the actual point of current flow. Confining the current flow to such a small area results in temperatures high enough to melt a minute volume of surface metal and initiate surface erosion. Now when the face of the flat contact was cut into four pie-shaped sectors an entirely different erosion pattern developed. Essential to the success of this novel idea was that the point of contact lie within the center of the two cross-cuts. This being the case one of the pie sectors would provide slightly better contact than the other three and the current flow would occur between the radiused contact and the respective pie sector. As erosion and metal transfer began to take place contact also would be made with one of the remaining sectors. Fortunately this development took place before an objectionable spike could form. And the result, of course, was that the fresh contact area offered less resistance than the old eroded area causing the current flow to shift to the new point of contact. Not until all four sectors were subjected to current flow would an objectionable metallic spike appear. Contact life thus showed a significant improvement over the conventional plain face configuration. The hollow point, which is more cheaply produced displays a similar wear pattern. Erosion proceeds evenly around the ring but no definite spike as such appears. When the entire ring has been eroded once due to burning the pattern again repeats itself. Satisfactory operation of the points continues until either current passage is adversely affected due to the erosion-corrosion process or so much metal is lost from one contact face that regapping is impractical. Note the wear patterns shown by Figure 6

for visual verification of this fact.

Previously it was stated that the early Delco point would provide superior high rpm operation due to its lighter movable arm. It will be stated that, in turn, the new Delco provides even better high rpm performance than its older counterpart. Actually point bounce is a result of three factors: the weight of the movable arm, the rigidity of the fixed contact, and the closing spring tension. The metal tab to which the fixed contact is brazed has a spring rate and a mass and hence will begin to vibrate if properly excited. This problem is common to nearly all engineering applications wherein vibration or excitement is encountered. Since the fixed contact is being struck at regular intervals by the movable arm, the necessary excitement is provided. At some rpm, or frequency, the metal tab will vibrate in such a manner so as to influence the closing pattern of the points. The variable are many and too complicated to be presented here but their effect is that of contributing to the overall point bounce condition.

Bounce can be significantly reduced if the rigidity of the metal tab can be either increased or reduced (this will be further discussed in the next issue). Delco chose the latter approach and produced a point set which shows a different front suspension technique. Actual mounting of the point set is by two screws which anchor the plate to which the point is flexibly attached. Positioning of the non-movable contact is by a spring fitting which holds the front end of the point plate snugly, but not rigidly, to the anchor plate and a screw which maintains the proper gap setting. The net result, assuming the securing spring is not too stiff, is a more satisfactory contact set which shows improved high rpm operation.

Now that the conditions contributing

to point bounce have been exposed, their effect on coil performance will be investigated. By means of the aforementioned stroboscope and an oscilloscope the degree of bounce may be recorded, the flow of current shown, and the coil output voltage measured. To obtain a proper relationship our test ignition system first will be operated under ideal conditions — no point bounce. Reference to Figure 5 indicates that indeed the points are cycling properly. The oscilloscope trace of Figure 7 is that of the primary current flow as a function of time (time the points are closed). Using the oscilloscope now as a voltmeter the corresponding output voltage, Figure 8, may be read. Next the points will be allowed to show signs of initial bounce as indicated in Figure 9. Note that the trace of the current flow, Figure 10, shows a break or discontinuity corresponding to the dark line of the stroboscope pattern. As the points again close after the bounce the current continues to build up but to a value which is slightly less than that recorded during perfect operation. Correspondingly the output voltage shows several spikes lower than normal as indicated in Figure 11. For the final test the bounce condition was allowed to fully develop — see Figure 12. The oscilloscope trace of the current flow, Figure 13, now shows that the bounce was of such magnitude that no uniform buildup of current could result. From Figure 14 one notes that rather than producing one timed discharge, the coil was continuously discharging, effectively eliminating distributor timing.

So now you ask, so what? How does this affect the operation of my engine? Well, the rpm selected for the tests was 5800, and the voltage recorded under perfect system operation would probably have been adequate for all but high compression or blown engines. The voltage resulting in test two would have caused definite missing of most engines, while the voltage pattern recorded in test three indicated that engine operation at the specified rpm would be impossible. Condition three may never develop in your ignition system, but it can and does occur and will at this time limit your performance as stated.

What the information presented in this article leads one to conclude is that the stock, single point, eight cylinder ignition has very definite limitations. Whether this need concern your particular ignition requirements is something which cannot be stated at this time. As deduced from above, the subject ignition system is quite limited as to the range of engines it may serve. Witness this by the fact that Chrysler, Chevrolet, Ford, and Pontiac all provide dual point ignition systems on the performance-intended models. At the conclusion of the second article you should possess the information necessary to analyze the ignition requirements of your engine. This means that yet to be investigated are modified stock units, specially designed units, and non-stock coils. We'll look into these in next month's Rod & Custom. ●



Figure 12. Shown by the stroboscope is the fully developed point bounce condition. To the left and almost under the distributor is the representative pattern. Due to a shifting of the bounce position the other patterns are blurred. As mentioned in the caption of Figure 9 this pattern occurred as follows: Ford 5600, early Delco 6400, late Delco 6800.

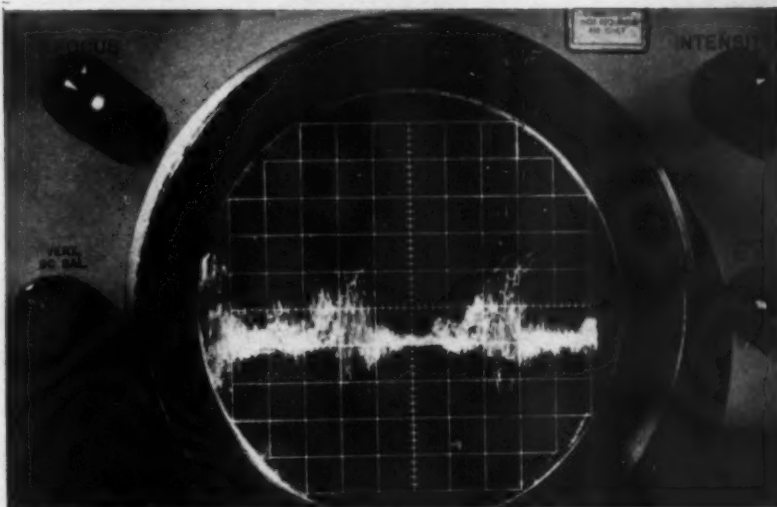
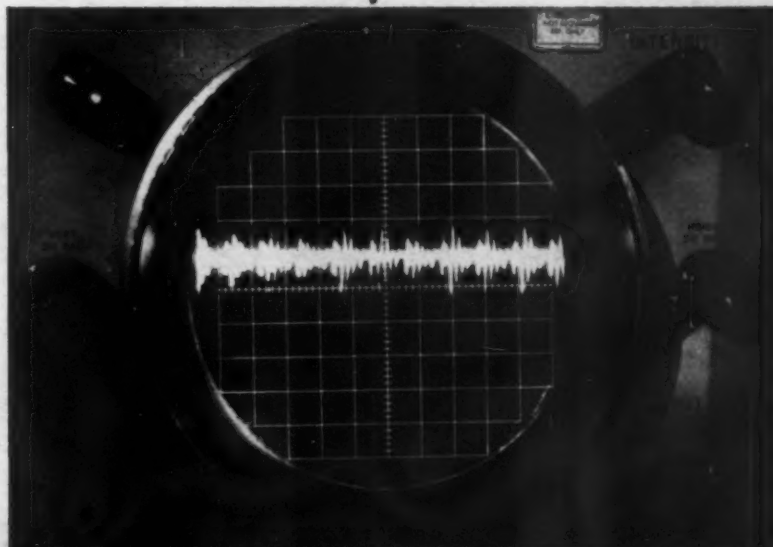


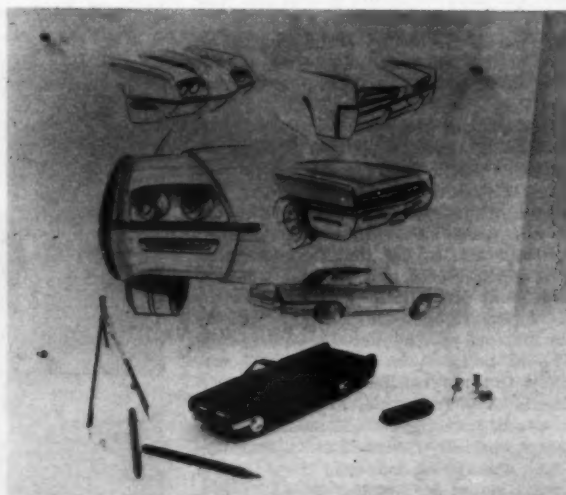
Figure 13. The current rise (or lack of) as traced by the oscilloscope. Since three bounces occur the current never attains a smooth build up.

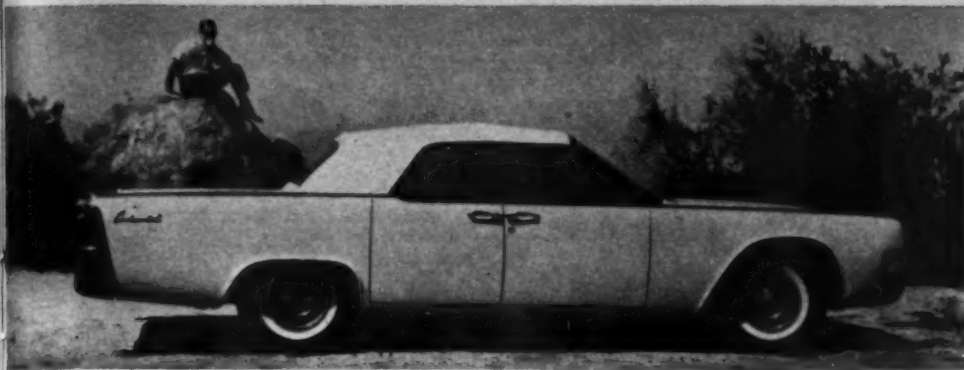
Figure 14. Voltage to the spark gap during the fully developed bounce is quite low and irregular as indicated by the short and continual coil discharges.





• *off the sketch pad* by TOM DANIEL





Whenever one of the older Lincoln Continentals glides past our office, we begin to yearn for "the good old days," and this dreamboat was the epitome of automotive styling for many years. Since its original success in the '39 Continental, and a brief flash of past accomplishments in the plush, posh and precious MK II (built in '56 and '57 at \$10,785 per copy), the Lincoln stylists had really dropped the ball only to recover beautifully with the '61 Continental, now back under the Lincoln tag. For a big car (218.5 inches overall), it's exceptionally tasteful, but conservative and restrained almost to the point of being staid. Since many of these fine machines are now being purchased by younger people than in years past, we thought that it might be fun to put artist/designer Tom Daniel to work sharpening his pencil and polishing his crystal ball, so that we could peer into its depths to see what styling changes *could* occur in the near future....



• off the sketch pad





The Continentals of the past were designed along the theme of "modern formal," and the Connys of today have continued that idea. But to reduce the tight, boxy appearance of the current model, artist Daniel has extended the front and rear wheel well fillets, lending an air of additional motion and graceful continuity, while retaining the taut feeling. Obviously, the major alterations on our "production prediction" are in the road illumination department, where the familiar dual headlamps are replaced by tube-type, non-glare polaroid units, with integral turn signals, the whole business being recessed into the hood. Simpler bumpers are shown front and rear.

The greenhouse, or roof, is left untouched, since it has excellent proportions now. The rear end treatment is similar to that of the front, with the tubular theme being carried through in the taillight styling, split by the reversing lamp. The entire unit is again, as in the front, recessed, this time into the deck lid.

Wheel discs and/or hubcaps on this Cloud Nine Special have been omitted in favor of cast integral wheel assemblies, for better brake cooling—an essential item for heavyweights such as the Continental.

Most changes come as a natural evolution of new developments and ideas on the part of the engineering groups as well as the styling people, and also the desires of the buying public, insofar as what the cars are going to look like. While the control of the public taste is in the hands of the stylists to a large degree, we feel that sales figures are quite capable of indicating to the manufacturers whether the latest models have satisfied the customers or not. In this case, we know of several customers who would be quite satisfied to have one of these luxurious dream-wagons parked in their driveways—namely us!



THE SIL VER EAGLE

platinum painted 'bird possesses personality

photos by neal east

Grille resembles the stock item but it has a third dimension added.

Full tonneau cover fits down snugly, keeps out dirt when the top is off.

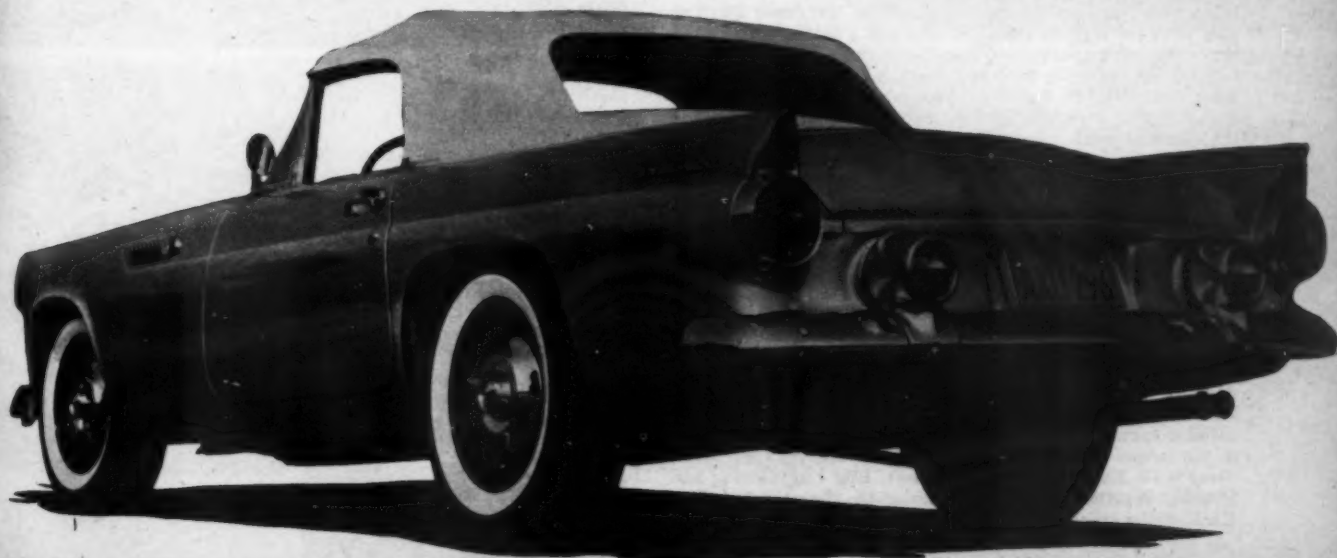


Question: "What can be done to a '55 T'bird to remove the "sissy" appearance without much costly metalwork?" An example of the answer is the Bird modified by Neal East, of Los Angeles. Up front, the grille molding has been replaced with '57 molding and bumper has had all the ten bolt holes filled. The grille is a true egg-crate type, peaked in the center. Wheels were reversed and painted black to contrast with the Platinum point. Hubcaps are small '54 Ford with accessory knock-offs added. Phony side louvers were backed with screen and the Y-block V8 emblems gave way to '58 T'bird items. At the rear, a '56 T'bird gas filler door does away with emblems. Blinkers from a '59 Buick are vast improvement over stock and '56 backups are fitted with red lenses for turn, stop lights. Quad exhausts exit under axle without bends, yet extend to bumper. Suspension is beefed with heavy-duty shocks, station wagon front springs, Traction Masters. Bud Henningsgaard, of Inglewood, California is now owner of car.

Regular readers will recognize car's taillights from the April, '61 R&C T'bird taillight tips article.



(Above) Black and white interior goes well with the Platinum point. Rear view evidences slight forward rake; note unusual exhaust system.



Tiny Bear '61

THE FIRST DAY OF JULY is no time to be caught in the Mojave Desert, even at poolside. 104 degrees in the shade...and no shade! Yet with almost an indifference to the situation, a crowd of over fifty mini-bike riders assembled on that hot summer date to don leathers, helmets and vie against each other and the sandy desert. The scene was Vincent, a tiny crossroads south of Palmdale, California and recently bypassed, as the main mountain pass highway from Los Angeles was diverted northward. Early on that Saturday morning the insistent rap-rap-rap of the uncorked 2-cycles shattered the peace of the yet-cool desert air. By ten o'clock a riders' meeting had been held and the bikes were lined up awaiting the flash of the green starting flag from the hillside ahead. A mile and a half of varied, yet never relenting course was ahead, and three laps composed a heat in the *Moto-Cross*-scored Hare Scrambles. Three heats were run with the starts an hour apart. Not all the eager group put in an appearance as each new event commenced; the heat and mechanical failure took their toll. By and large, however, the majority were back into the fray each time, often through the courtesy of hasty pit repairs and the refreshment of a tall, cool drink.

R&C Staffers were assisted in the running of the event by members of the Pasadena Motorcycle Club who lent both willing hands and plenty of know-how to assure the success of the run.

The afternoon sun, still blazing with a vengeance, brought the Field Meet to an early close, several of the events cancelled by unanimous consent. Results were tallied and computed and the coveted cups passed to the winners. First place winners in each class for Hare Scrambles and for the Field Meet picked up a pen set with a bear figure. Second spot rated a cactus. Third and fourth places were also awarded in the larger classes. Trophies were donated by Caper Cycle, Steen's, Go Kart Mfg. Co. (2 classes), Bug Engineering and The Bill Matthews Co. R&C awarded the Sweepstakes Cup. Each of the other groups sponsored a full class of trophies.



Riders' Meeting at 9:30 outlines day's activities for the race entrants. R&C Editor stresses the method of starting, "Dead engines, straddle your machines with both hands in the air. When you see this flag drop — Start 'em and get going!! The race is on, everyone have a ball!"



Over the hill and down into a valley, riders follow the line marking through arch of scrub trees to the first checkpoint. A card taped on helmet is marked.





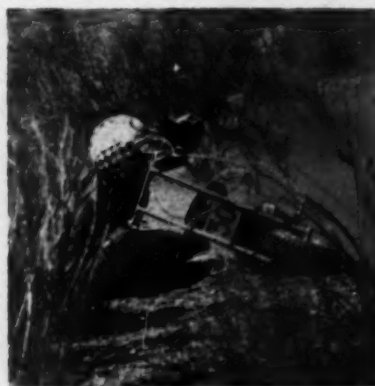
As the pack breaks away from the starting line the direction of the course beyond is indicated.



Sand and cactus make tricky going with small 6" wheels. Bob Geist on Caper Cycle from Walla Walla, Wash. leads R&C Adman Watkins on Savage into second check. Rest of pack was strung out up to half a mile behind leaders.



Narrow sandwash bounded by scrub and cactus proves a bottleneck.



Watkins gets around Geist (left). Slightly larger machine and maximum allowed (6") wheel size helped in areas like this deep, sandy trail. Flat-track bike rider Pat Dale takes busman's holiday on Super Savage. Pasadena Motorcycle Club member marks Pat's card. The champ goes down! Don Watkins takes a header on sweeping hilltop turn. Sweepstakes win was worth it.



Pit action between heats was as hot as the competition on the course. Ace Eads' Go Kart Scrambler (left) was dressed to the hilt, and labeled, "If it won't go Chrome III" If one won't do—try two might be the admonition on the Luther above. Only woman entrant (right) was Mary Jane Vance, a really game gal.



Clinton-powered Flea works its way through cones on Pylon Race, first event of meet.

TINY BEAR '61



At left we have what is known as a Slow Race. Object is to be the last one to the finish line without putting a foot down — no easy task on quick-handling miniature cycles. Above is the Balloon Bust, idea being to break other's balloons and leave their head intact!



Australian Pursuit Race starts with riders in single file, trying to pass those in front, which disqualifies them. The size of the circle is constantly changing while the riders are racing.





Boot Race consists of riders putting their boots in a pile, which officials kindly mix up (above), racing in socks to pile (above right), segregating and putting on their own boots (right), and racing back to the finish line. It's a bit more difficult when the first riders to the pile toss their boots hither, thither and yon (below), considerably adding to the confusion.



Four of the happy trophy winners proudly pose with their gold and mounts. They are, left to right, Larry Hester, Bob Geist, Chuck Swanson and Tom Davis. At right, Sweepstakes winner Don Watkins tiredly but happily accepts the beautiful award for the hectic but FUN day.

WINNERS IN TINY BEAR RUN - 1961 SWEEPSTAKES - Don Watkins Savage WB 500 FIELD MEET

A 1st - Bill Matthews, Matthews Ram Jet
2nd - Confex A400

A Super
1st - Bob Arden, Bug Basher

B 1st - Mary Jane Vance, Savage WB 500
2nd - Leslie Kupper, Go Kart, Sacramento
WB 700

A Open

No Entries

A Super Open

1st - Don Husted, Free MAC 6
2nd - Don Watkins, Savage WB 500
3rd - Paul Ruckert, Free MAC 6

B Open

1st - Tom Davis, Capri Cycle MAC 6
2nd - Bob Geist, Capri Cycle WB 700
3rd - Chuck Swanson, Capri Cycle WB 700
4th - Mary Jane Vance, Matthews Ram Jet
WB 700

HARESCRAMBLES

A 1st - Bill Matthews, Matthews Ram Jet
2nd - Confex A400

A Super

1st - John Buttrick, Go Kart, Sacramento
WB 500
2nd - Bob Arden, Bug Basher

B

1st - Gary Lee Smith, Go Kart
2nd - John Buttrick, MAC 6
3rd - Don Watkins, Savage WB 500
4th - Leslie Kupper, Go Kart, Sacramento
WB 700

A Open

1st - Bill Lind, Homestead WB 500

A Super Open

1st - Don Watkins, Savage WB 500
2nd - Don Husted, Free MAC 6
3rd - Ron Brager, Special MAC 6

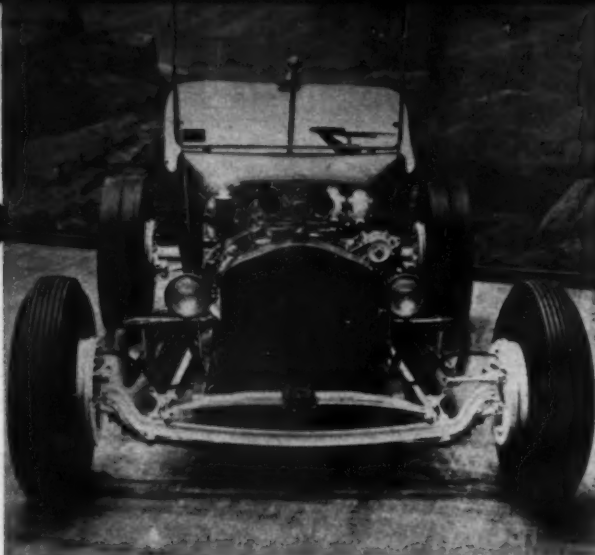
B Open

1st - Gary Swanson, Capri Cycle WB 700
2nd - Bob Geist, Savage WB 500
3rd - Bob Geist, Capri Cycle WB 700
4th - Larry Hester, Capri Cycle WB 700

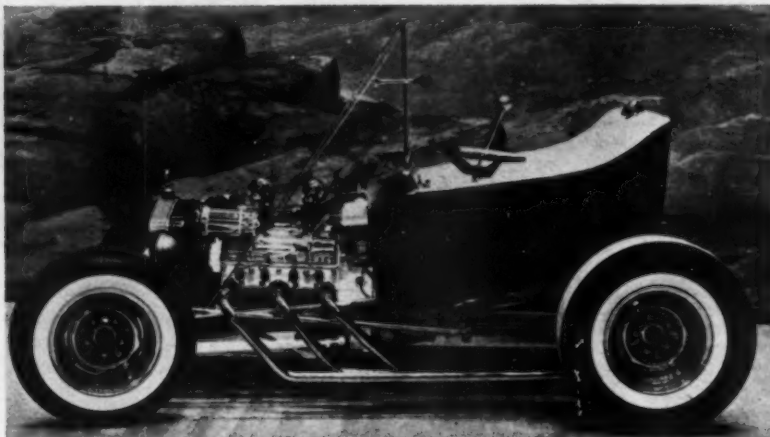
MIDWEST ROD ROUNDUP

Larry Ryan's
"shortT"

When Larry Ryan of Kansas City, Missouri became interested in hot rods, he decided to build a shortened T roadster and stuck with it until it was done. Starting with a Model A frame which he narrowed and shortened, Larry installed tubular crossmembers and a "bulldog" front end. Spindles and brakes from a '40 Ford were placed on the Model A axle and a '48 Ford rear end placed aft. A fiberglass replica of the '23 Model T body was channeled the width of the frame rails and a modified Oldsmobile engine installed. The dream had come true!

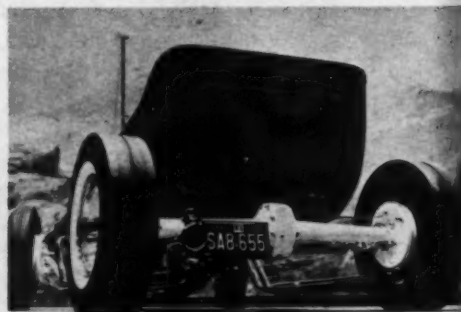


Dash of the roadster is extremely simple and clean. Giant shift lever leads to '39 transmission. Steering wheel is boat accessory item.

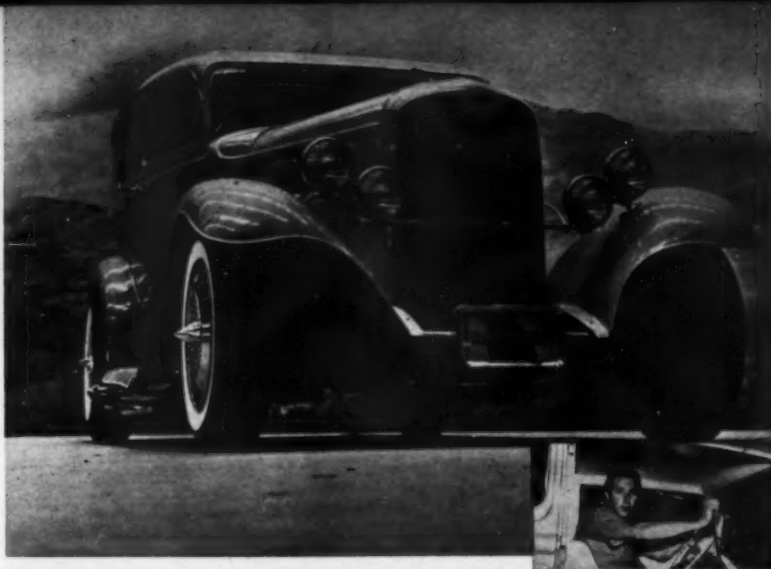


1952 Olds equipped with Iskenderian E-4 cam, Johns 11 to 1 pistons, Horne manifold with 4 94 carbs. Quarter-mile speed was 109 in 12 sec. Headlights are from Ford tractor. Detail work around wishbone mounts, firewall is excellent.

Short (88") wheelbase is apparent from the side. Steering pitman arm can be seen below door. Car uses reversed and chromed '51 Merc wheels.



Candy Titian Red lacquer paint makes contrast with white Naugahyde interior. Due to unavailability of many parts, items like the windshield were made by hand. 18-year-old Larry has about \$2000 and 2½ years of labor in the car to date.



MIDWEST
ROD
ROUNDOUP

Aldrich & Smith's
"Cut Coach"

Another fine example of midwest craftsmanship is the 1932 Ford tudor built by Jim Smith and Charles Aldrich of Kansas City, Missouri. They liked the massive appearance of a sedan so the Deuce fit the bill. The car was made to appear even longer by chopping the top four inches and installing a three inch dropped axle. To keep up with modern trends, a very neat set of quad headlights were installed up front. The metal work including the chop job, the point and the engine work were all done by the owner. Paint color is '60 Thunderbird red. Grille shell is filled. Inset shows Charles Aldrich at wheel.

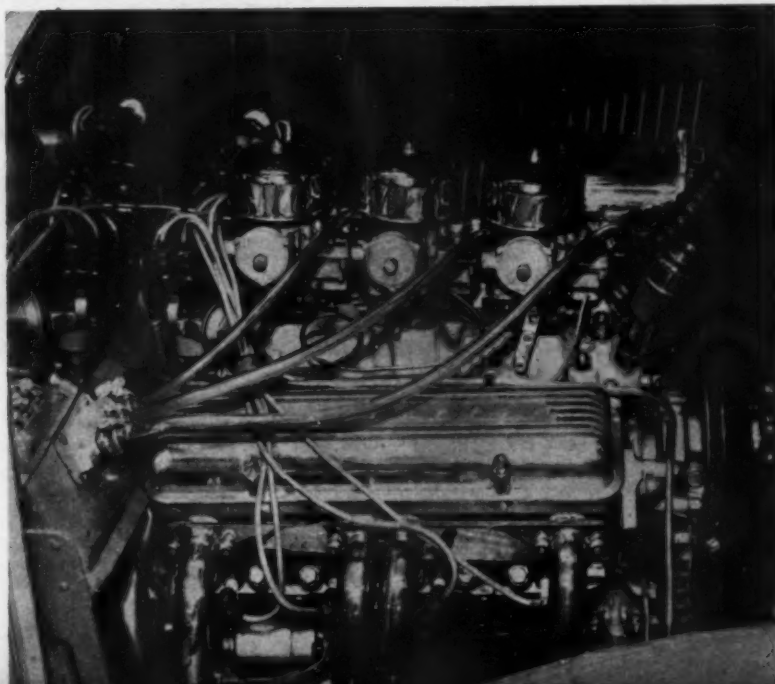


Full side view is very pleasing with chop job accentuating length. Lack of extreme rake also adds to appearance. Special hood panels with short louvers, side pipes, running board covers have been added. Door hinges have been faired.

For motive power a '56 Chevy 265" V8 was installed and modified. A Mallory Magspark ignition, owner-built headers and triple carburetors have been added. Inside is a 270 camshaft and solid lifters. Note the polished firewall cover.



Rear view continues the clean, well thought-out lines of the car. Quad accessory taillights are in keeping with headlights. Gas tank cap has a knock-off type cap added. All metal work is of excellent quality and is set off by the point.



Red and white Naugahyde covers door panels and seats with narrow pleats in diamond design. A 1956 Merc steering wheel is used. Panel below dash carries tach, extra instruments. Long shift lever, seat belts, '49 door handles used.



HIGHEST ROD AROUNDUP

Lou Brown's "Clipped Coupe"

Starting with just a body and frame which he traded a kart for, Lou Brown of Kansas City, Missouri, built this show and go '32 Ford coupe from the ground up. The frame received tubular crossmembers, lightened front axle and a big Olds engine. The body was given a 4" chop and filled shell. Lou decided to do something different with the fenders so he trimmed them radically and removed the running boards. Mack truck headlights are protected by chrome nerf bars angled to match the fenders. Steering for coupe was specially made from various parts.



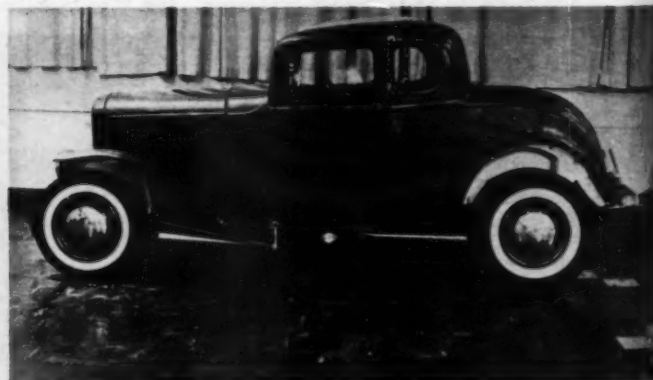
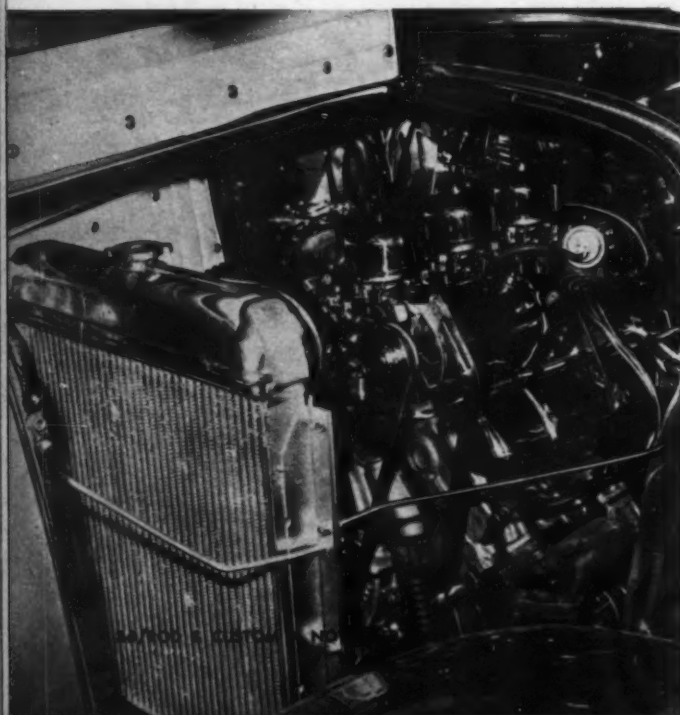
Pearl paint is contrasted nicely by tangerine and white Naugahyde interior. Dash is stock with late instruments. Pedals are suspended from firewall. Note wind wings, Impala wheel.



Lou is no stranger to cars, having raced just about every different type and having owned a variety of rods and customs. His present '32 coupe took two trophies at its first showing.



Dash view of the interior gives hint to the position of the engine. Dash has been built out and center section added. Steering wheel is from '59 Impala. Note tach on top of dash.



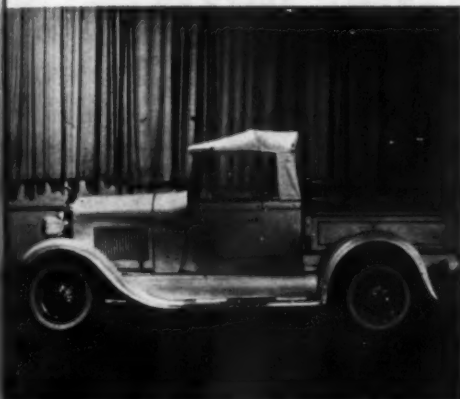
The Olds is backed up with a LaSalle transmission, 4.11 rear and ratio and 8.20 x 15 slicks. Side view of the car reveals trimmed fenders, split radius rods, steering emerging from frame, header plug just below frame. Volvo wheels are up front and Merz in rear.

The 1936 Olds engine appears to be trying to hide. Cubic inches of the Rocket have been increased to 370 by boring $\frac{1}{8}$ " and stroking $\frac{1}{4}$ ". Also helping in the horsepower is an Isky cam, Johns pistons, triple Rochester carbs, Flamethrower ignition and polished heads.

MIDWEST ROD ROUNDOUP

Curly Rucker's
"Injected A Freighter"

"It's a hobby my entire family enjoys", says A. M. "Curly" Rucker, speaking of his interest in hot rodding. Curly, of Fort Worth, Texas, has been an enthusiast for 25 years. His most recent project has been this '29 Ford roadster pickup. The car has been completely renovated and left stock appearing with the exception of the paint and wheels. Deciding to show the car around the show circuit, Curly found himself deluged with trophies. The car has garnered 19 of them after 9 shows. Among the laurels are Best of Show, Best Paint, Best Interior, Best Engine, many 1st's.



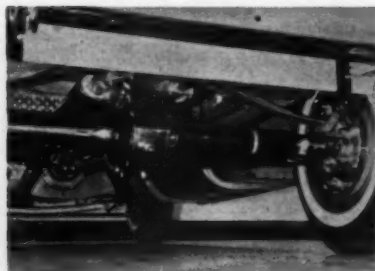
Platinum Pearl lacquer paint is immediately eye catching. Wheels are from '54 Chrysler Imperial and have 6.70 x 15 whitewall tires on all four corners. Headlights are '49 English Ford.



Curly and son "Bubba" particularly enjoy the car shows because it brings them in contact with other car lovers. All work except paint and upholstery was done by them including engine.

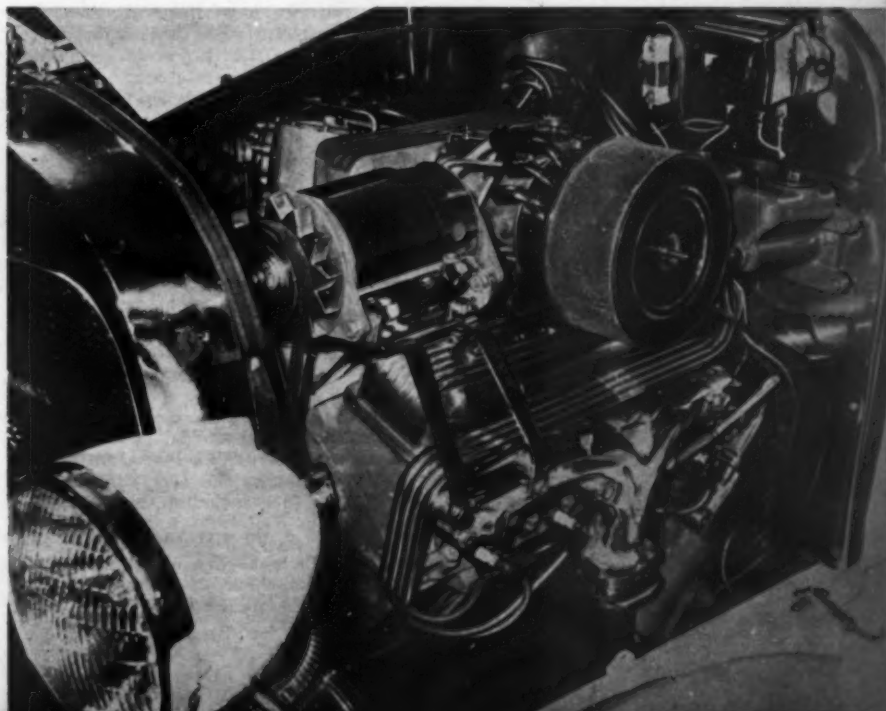


Pearl and blue metallic material covers the interior and Jaguar seats. Console in center carries radio, pressure pump, switches. Shift linkage is Ford column parts placed on side.



Underside of the hauler is as clean as the top. Torque tube, axle housing, backing plates and many items have been chromed. Tires have whites on inside. Extensive paint work is used.

Neatly tucked under the hood is a 283" Chev equipped with factory fuel injection. Corvette valve covers, cam and exhaust manifolds help push the pickup. Transmission is from '39 Ford.





DRAGGIN' with AMT's T-161 and DR-200

ELECTRIFYING FIAT AND DRAGSTER MODELS

BY BILL SIPPEL

THE AMT DR-200 cardboard box is really crammed full when you pop off the lid. You can build two complete shelf models with parts to spare. They make some wild shelf cars but where are they ala powersville???? The Fiat is a semi-natural, the streamliner has an interesting mounting and the twin engine open rail dragster is nowhere. Let us hasten to say the reason is lack of space for a motor large enough to be competitive at this time. We know of a motor soon to hit the market small enough to fit and yet fast enough to compete. With left overs being quite frequent in electric-powered construction we can end up with a shelf dragster as a bonus.

THE FIAT

The mounting of the electric motor will not interfere with any of the forward structure. The front axle, engine, etc. can be assembled as per the standard instruction sheet and mounted to the plastic frame. As we have mentioned in the past, bodies must be rugged, so it should be glued as a unit, body, hood, shell, top, etc. Mounting the pickups and guide pin is easy; we put them on the flat shelf area of the frame ahead of the plastic engine. To mount the electric motor the plastic frame

should be cut off $1\frac{1}{4}$ " behind the rear of the plastic engine bellhousing. The rear rib of the plastic frame that carries the bumpers may be cut off and mounted so you can have them attached. The electric motor frame will fasten to the flat area at the rear of the remaining plastic frame. For a strength factor we cut a gusset from the scrap part of the frame and glued it to the rear of the plastic engine and ran an extra mounting bolt through it. With the offset in the electric motor pan the rear of the frame may float or be attached; this is up to you. Due to the fact we are isolated on both pickups and the guide pin, wires will run from the two motor brushes to the pickups and we are ready to run. As it would take too much space to write all detailed information please refer to the photos in this article to clear up hard-to-understand areas. We say this in the case of the Fiat and Streamliner. This complete Fiat construction job should take about 2 hours from box to running (not counting glue drying time). The cost will be from \$7.00 to \$9.00 including the AMT kit.

THE STREAMLINER

This will be a slingshot slingshot; not a misprint, the motor will ride slingshot in the slingshot cockpit. This type motor

demands a precision-built frame, from brass by preference. The frame must mount the motor and hold the axle in perfect alignment with the motor. It must be both proper distance from the motor and maintain proper side gear mesh. Too tight a mesh and rpm drops, motor heats; too loose and teeth fly.... A picture can show at a glance what would take much space to write as to frame design. The complete unit can be fastened together by putting four 2-56 screws through the plastic body, through the brass frame and tightening into the motor mounting holes. As to the kit plastic, the two slingshot halves can be glued together as in the instruction sheet, *except do not glue the bottom of the unit back $2\frac{1}{4}$ "* measuring from the front. The motor and frame are a little wide and they force a slight seam spread at this point. Do all frame fitting before you install the windshield canopy to stay. Before gluing the front section together mount the guide pin and pickups. These will mount to the plastic bottom near the front axle. In the case of this style electric motor mounting the entire plastic frame can be omitted or the forward half may be used, depending on the amount of detail you want to show. It would be wise to leave the top half of the forward section

free so you can get in to change pickups at a later date. In our case where we did not use any of the plastic frame we just fastened the front axle to the lower plastic pan and the plastic engine to the hood via the glue route. Wiring to get running will be the same as in the Fiat and cost in this case including the AMT kit will run from \$8.00 to \$10.00. Time will be longer by far than the Fiat with the care that must be taken on the frame.

In both cases motors used were Auto Hobbies'. They are built for car use and manufactured to Auto Hobbies specifications by two of the leading electric motor builders in the United States; all American products that go fast

CAR AND TRACK PICKUP DETAIL

In the past we have learned the speed of the cars and ways to build them. However we are lacking the finer detail in pickup assembly, track layout and wiring.

THE CAR

The pickup system in drag racing follows a basic simple type. This is not the best way for road racing cars so please do not use this style for other than dragging. Basically, the front tires should roll on the track surface. The guide pin should be at the center of the front axle looking from both the side and front. The pin should be $\frac{1}{16}$ " brass or steel rod, extending $\frac{3}{16}$ " to $\frac{1}{4}$ " below the tire-track surface to guide the car down the strip. The pickups mount on

each side of the pin, coming down from the frame to contact the track surface. They should have enough tension to make good contact with the track but not be stiff to the point of holding the front wheels in the air. The best system is to fasten the pickups to the frame forward of the pin and contact the track surface at the pin. Never lead this type pickup; always trail them. The best material to use is steel or brass shim stock from .002" to .005" thickness; thicknesses being controlled by the length and width. Normal width should be between $\frac{1}{8}$ " and $\frac{3}{16}$ ". Another material that works well is braided copper. One of the pickups must be isolated from any metal that touches the motor in any way. This pickup is wired to the isolated brush of the motor. Which pickup is isolated will be determined by the motor and gear rotation to give forward motion. In our case we mount motors and gears so the isolated pickup is on the right side looking in the direction of travel. The ground pickup can be wired to any metal in contact with the motor or the opposite brush. On motors where both brushes are isolated the wire must go to the brush. On full pan motors with a grounded brush, and where the pickup is screwed to the pan, no wire is needed. Thus from the complete circuit standpoint, the car is now ready to run.

THE TRACK

The guide pin slot in the track should

be $\frac{1}{4}$ " wide and from $\frac{3}{16}$ " to $\frac{1}{4}$ " deep. On each side of the slot some form of electrical conductive material should be placed. One side is wired to the transformer and the other side to an on-off button. To complete the circuit a wire will run from the other transformer post to the opposite side of the on-off button. We wire all tracks together but this need not be. We do it so all cars get the same juice at the same time, eliminating excuses for losing. In most cases a reversing switch is on your transformer in case your car moves backward; or the wires at the track may be reversed.

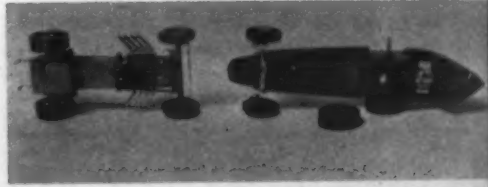
CONCLUSION

For those finding materials too high or hard to find, Auto Hobbies builds drag racing pans, components and complete cars. They also produce 2 different drag strips. Each is 2 lane; one is a do-it-yourself kit, all materials included. The other is a deluxe unit, a pure rubber strip that has tire bite.

Next month we will list all the rules and classes so you can be competitive throughout the United States at "mail-in" meets. Auto Hobbies currently holds drag meets the last Saturday in every month and mail-in cars are invited. Twice a year National Championships will be held with the deluxe treatment . . . full scale $\frac{1}{4}$ mile drags, dual lane all-rubber track, all classes, Chrondek Timers and official records. Join us; it's like fun



Left. The Fiat with the body removed shows balance in racing trim. The Streamliner has forward top removed, with the plastic engine glued to the hood. Right. Looking under the Fiat and into the top side of the Streamliner, which shows the two different motor mounting styles. Below, left. The AMT Fiat coupe stripped down shows the plastic frame and assembly. Motor is especially made for racing by Auto Hobbies.



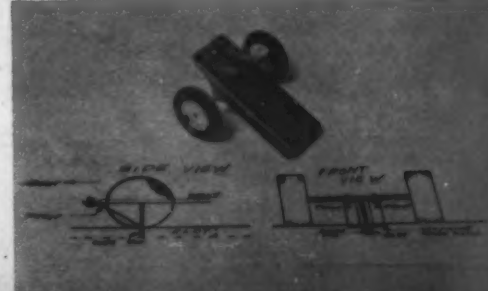
Below. The AMT Streamliner looks to be a standard shelf model, as there is very little body work to be done to install motor. The motor and pan is installed through the cowl.



The Streamliner in a totally dismantled state shows the body shell, motor, motor mount pan and gear train. Also note the electric rail pickup mounted up front of body.



Right. Diagram of front and shows proper installation of pick-up system from car to track. Guide pin should be made of $\frac{1}{16}$ " brass or steel and extend $\frac{1}{4}$ " below track.



Customizing AMT's CONTINENTAL

By Bill Sippel



1. First, cut top half of grille off. Next cut into hood and body, so that new grille will set back inside the fender contour. Use plastic balsa to reshape front end, smoothing to grille.



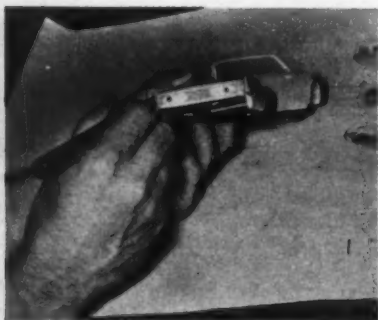
2. Use a fine file and sandpaper to shape and smooth plastic balsa after hardening.



3. Plastic balsa wood is now used to build up rear fenders and to extend fender flair.



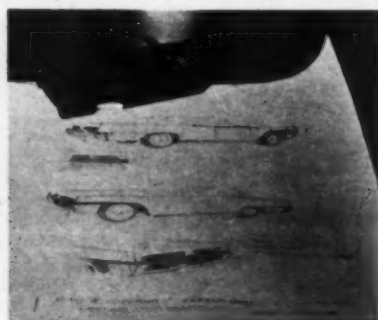
4. After plastic balsa wood has set up, sand and file smooth body side panels and flair.



5. Use a sharp knife to smooth plastic balsa in hard-to-get-at corners when you can't sand.



6. Spray entire car with a light coat of prime to show up imperfections in body work.



7. After wet sanding out all imperfections and body is smooth, spray on final coat of prime.



8. Dry sand primer coat once more and then spray on final number of desired color coats.



9. Attach bumpers, undercarriage, chrome accessories and other detailed parts.



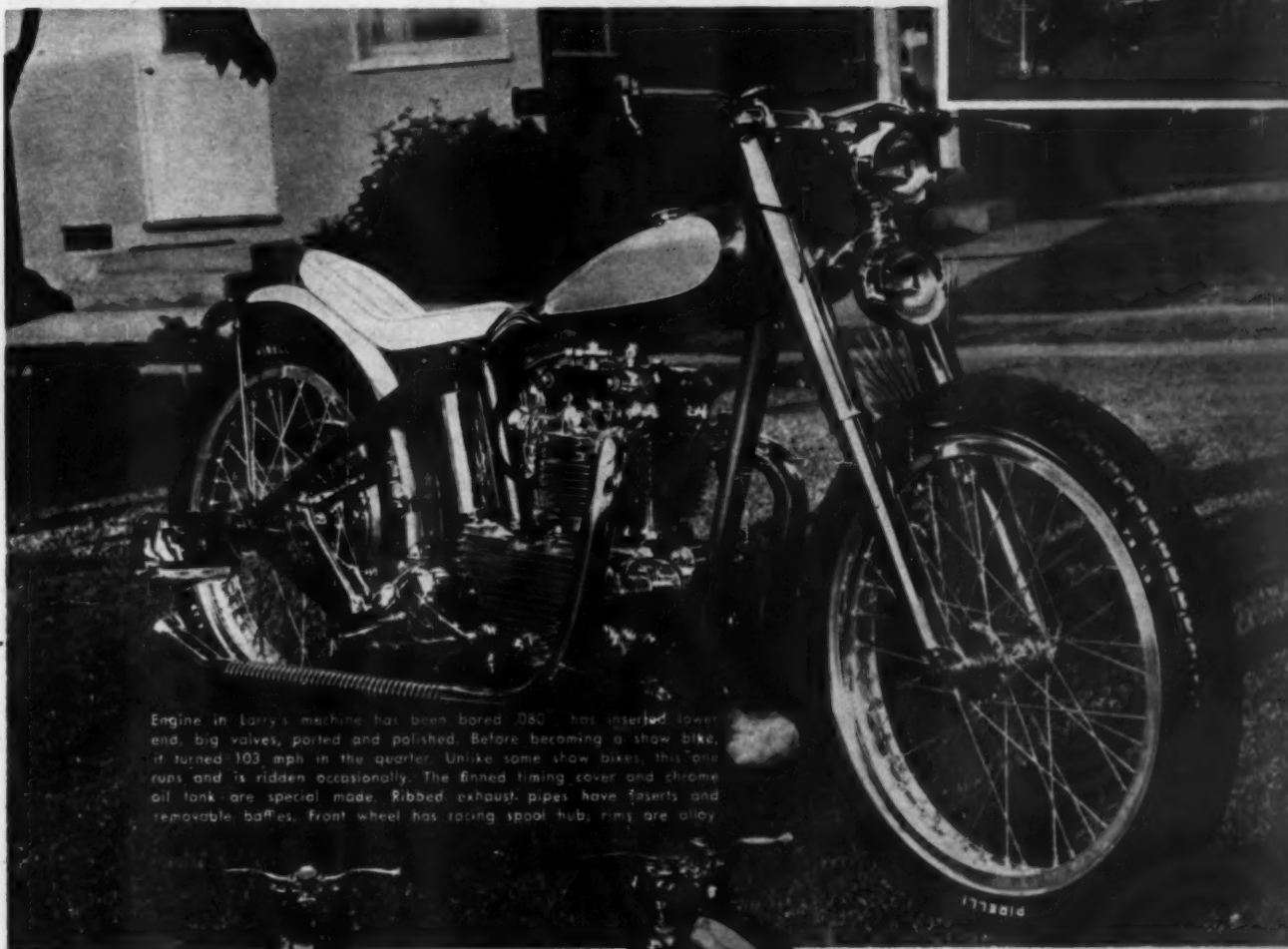
10. Now use small brush to color in details, such as upholstery, dash, and trim, etc.

SHOW BIKE

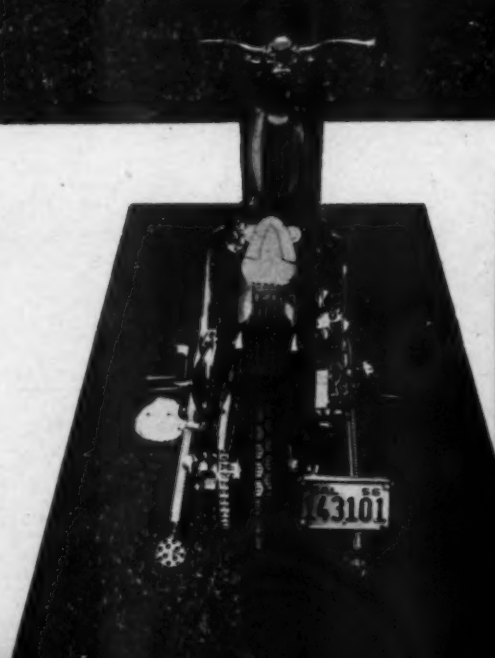
trophies attest to triumph's qualities

Sharing the limelight with the rods and customs at the local shows in recent times are the show bikes. One of the very finest of this breed is the 1952 Triumph which belongs to Larry Howard of Los Angeles. Every inch of the frame has been hand detailed and molded. The tank was made from a '37 LaSalle headlight and molded to the frame. Welding rod was molded to the tank and rear fender for ribbed effect. Paint is candy red and pearl lacquer. Pegs are red Lucite. Larry shunned use of high bars.

photos by marie beck



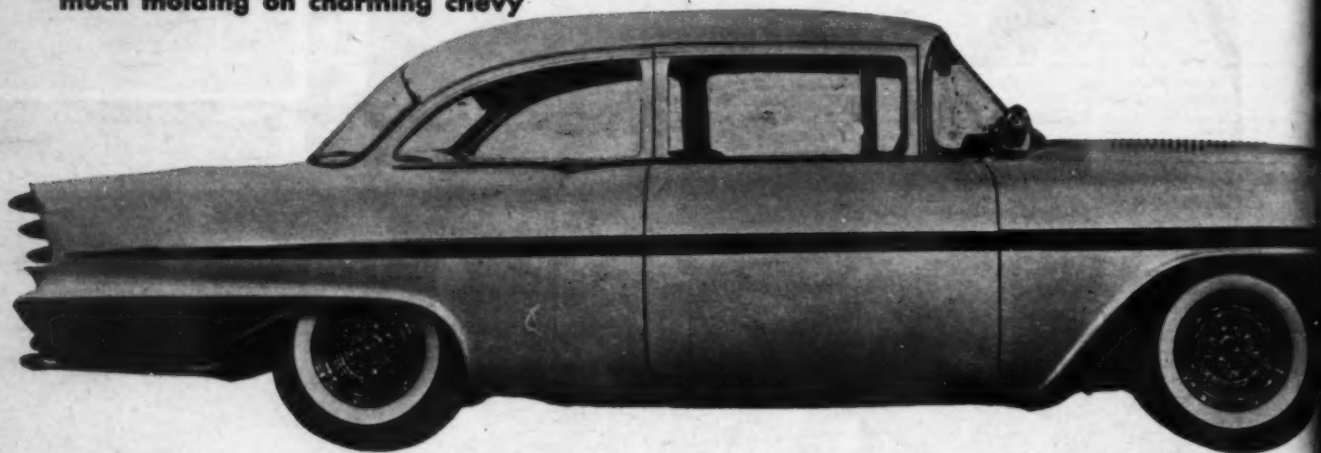
Engine in Larry's machine has been bored .080" has inserted lower end, big valves, ported and polished. Before becoming a show bike, it turned 103 mph in the quarter. Unlike some show bikes, this one runs and is ridden occasionally. The finned timing cover and chrome oil tank are special made. Ribbed exhaust pipes have inserts and removable baffles. Front wheel has racing spool hub, rim is alloy.



Kansas City Kemp

much molding on charming chevy

When Don Jackson of Kansas City, Missouri, noticed that the newest look is upswept lower body lines, he decided to see what could be done along those lines with his '56 Chevy. Turning the car over to Farner's Custom Shop, the ideas soon became a reality. The front fenders were shortened and pulled in, leaving only enough for the headlights. This left the front suspension exposed, so the lower A-frames were chromed. Rear fenders received a mild fin flowing from wheel openings and tucking inward at the bottom and continuing around the rear of car. Door handles and stock side trim were removed and '58 Chevy trim installed. Wheels have been chromed and reversed and capped with "spiders". Finally, the up-to-date metal work was sprayed with equally modern pearl lacquer. Don's Chevy has begun to reap an enviable show record: 11 trophies in 4 shows!



Outstanding front end treatment disguises identity of car. Tubing and sheet stock have been used to form grille shell. Headlights are '58 Lincoln Continental with Lucas lamps; grille mesh is '58 Ford with Cadillac bullets. Corvette bumperettes are used for protection. Hood has been liberally louvered and antennas placed in fender top.

Engine is a '60 Corvette which has been bored $\frac{1}{8}$ " to give 301 cubic inches. An Iskenderian full cam lifts lightened and polished valves. Heads are ported and polished and give 11 to 1 compression ratio. A Mallory distributor, Edelbrock six carb manifold, Hedman headers are used. Schiefer flywheel and clutch connect engine to Corvette trans.





Special shroud has been built for the license plate and tubing used to roll edges of tail-light openings. Six '59 Cad lights are used. Lower pan and side fins were formed by hand. Notice bumpers, tail pipes.

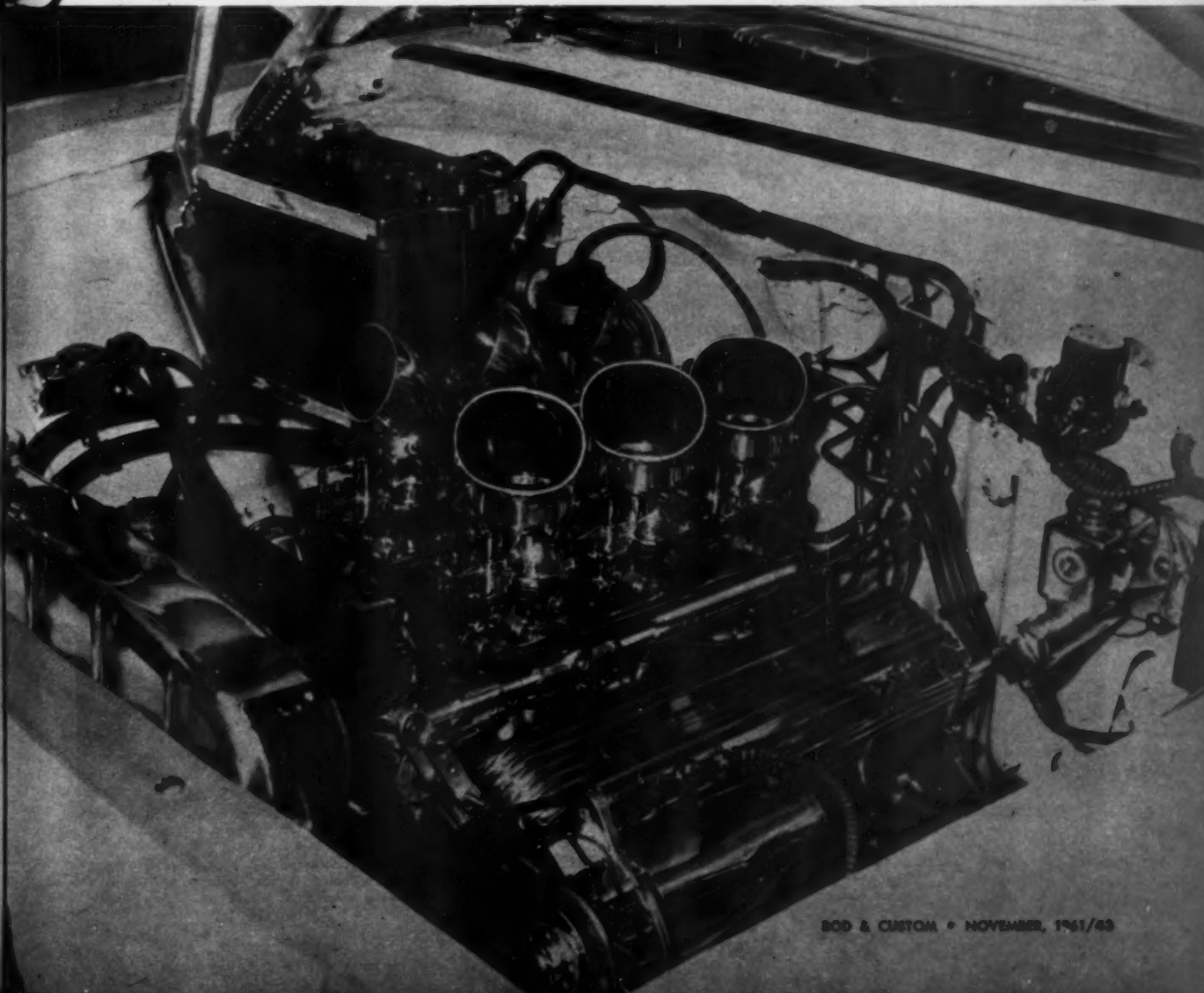


Detail view of taillight area shows extensive work which went into construction of opening. Shape is similar to original. Recessed lights look better than if they protruded. Side fin fairs into rear wheel opening for smooth line.



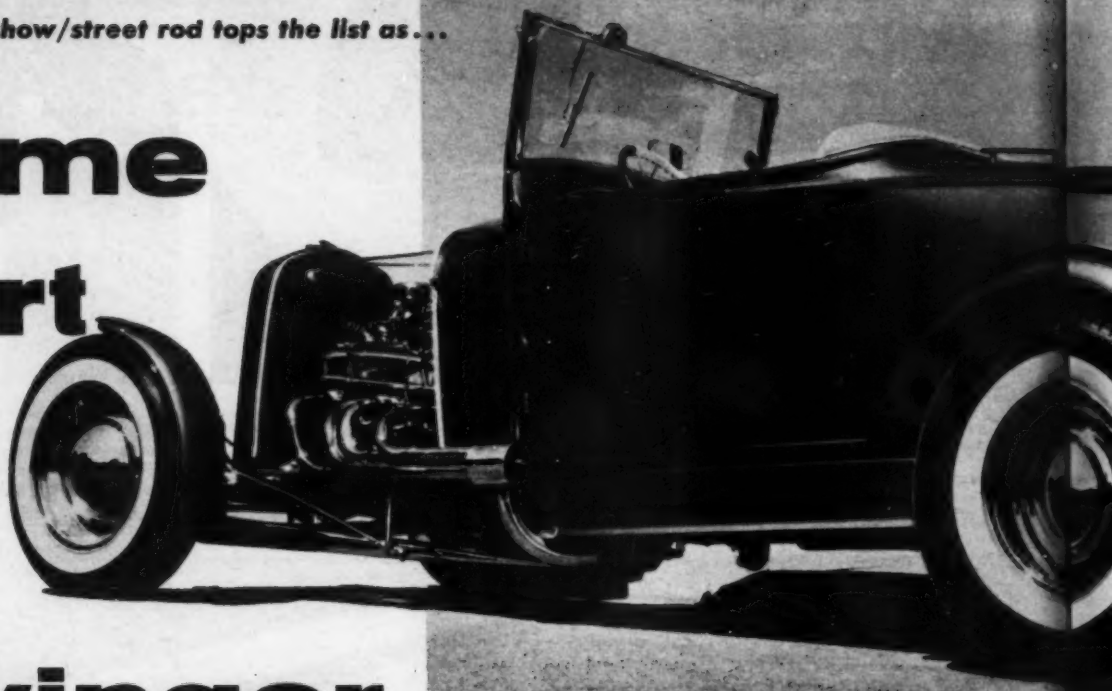
Interior has received the full treatment with red and white Naugahyde sporting many plaits. Steering wheel is from a Corvette. Tachometer, oil pressure and amp gauges, custom dash knobs have been added. Seat belts, floor shift used.

photos by bob hegge



click guasco's show/street rod tops the list as...

Some Sort of a Swinger



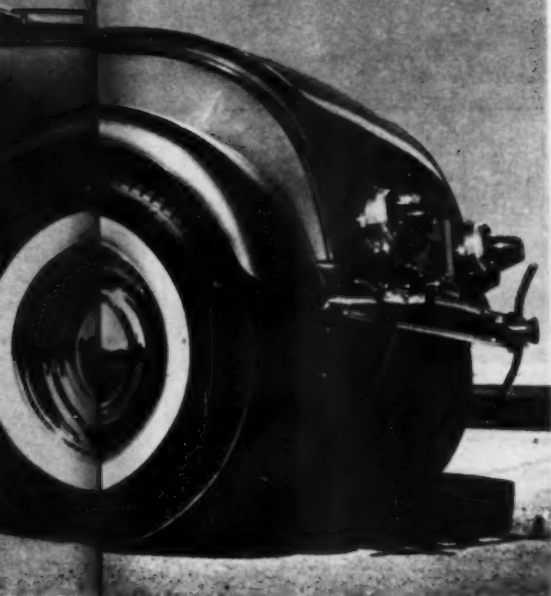
Immaculate interior of Dick Guasco's '29 Ford Roadster features solid pearl pleats, rolled edges, accented by neat rows of pearl covered buttons, all in Naugahyde. Jerry Sahagon, renown custom interior stylist in Northern California is the creator of Guasco's award winning interior. Stewart-Warner instrument panel is fitted neatly into stock dash. Steering column is graced by Impala wheel.

Left. '29 Body mounts classically atop '32 Ford rolls with a slight rake forward in pure California fashion. Pleasanton, Calif. rod won title of America's Most Beautiful Roadster at the '61 Oakland Roadster Show.



Below. Holibrand quickchange center-section sits astride chrome axle housings, springs. Tubular shocks cushion the ride all around on Dick's roadster. Late Ford rear end, Merc. brakes have been installed. Note the combination nerf bar and rear exhaust setup.

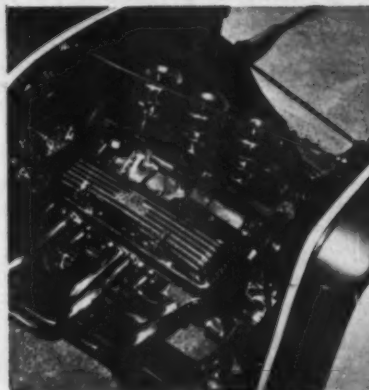
photos by dave cunningham



Above. All body work and wild pearl orchid lacquer is credited to Joe Ortiz's Custom Shop. Chrysler Imperial rear blinkers set off the rear pan nicely. Wheels have been chromed and reversed, rears utilizing Buick outer rims to get wide base effect. Rear fenders are bobbed while the fronts are custom fiberglass units. A friend, Al Stanton, assisted on the chassis.

Above right. King Bee headlights mount above dropped '32 Ford axle, completely chromed frontend. Deuce grille shell retains the stock emblem, radiator cap, but has been shortened 3 inches. Dick built roadster up over a period of four years, investing nearly \$5,000 in this time. To date he has won over 30 first place show competition awards attesting to quality.

'57 Chev V-8 has been punched out to 4 inches bringing cubic inches up to 301. Forged True pistons fitted with Grant rings fill the new bars while a Clay Smith cam handles the valve train. An Edelbrock triple manifold and a trio of 97 Strombergs feed the fuel charge through the ported, polished heads. Mallory provides the spark. '39 Ford floor box is put to use.



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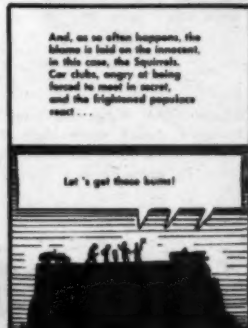
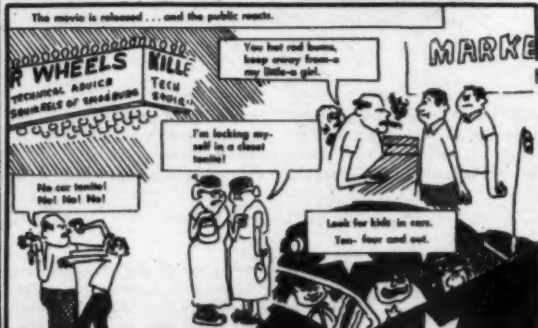
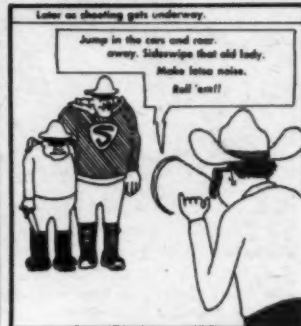
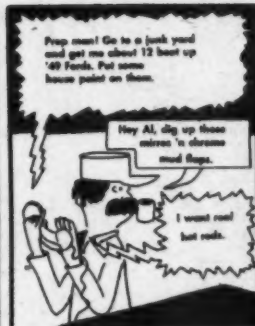
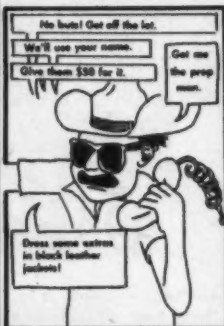
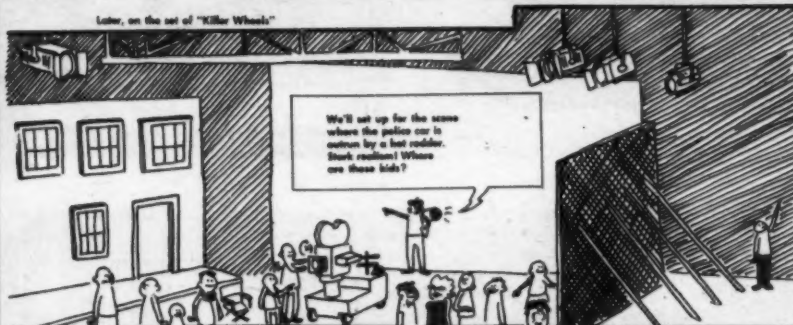
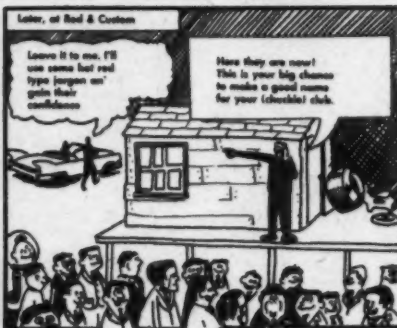
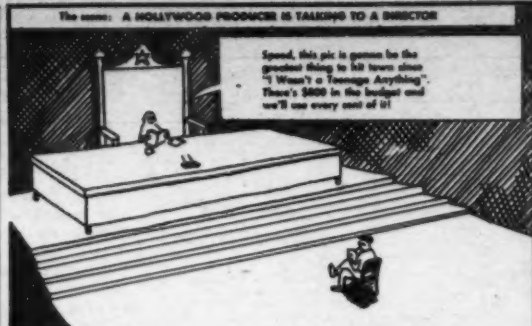
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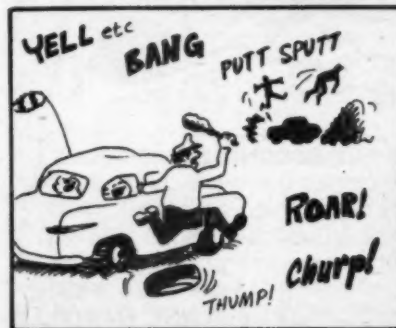
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SELL - Over 20 model cars of various makes; about 35 model car engines - Buick, Pontiac, Chevy, Chrysler, Olds, etc. Also have many extra parts including frames, wheels and so on. \$25 or best offer, Alec Matland, 27861 Lathrop Blvd., Lathrop Village, Michigan.

SELL - 1934 Ford sedan, restored body, new black point, completely stock appearing. Has 1954 Olds engine and beefed Hydro, hydraulic brakes. A real "sleeper." \$450. Tom McMullen, 1928 McMillan, Compton, California. NE 8-3973.

SELL - 1932 Ford roadster, featured in August 1961 Rod & Custom. Rebuilt from ground up, has flawless body, black paint & interior, big Merc. Bathead, all original parts. \$1400. Murphy Tiffany, 4539 W. 164th St., Lawndale, Calif. FR 4-4359.

SELL - Complete collections of Hot Rod and Rod & Custom magazines. Also many extra issues of these and others including Speed Age and Road & Track. Send stamped envelope with needs to "Back Issues," P. O. Box 45912, Los Angeles 45, California.

SELL - '53 Dodge tudor hardtop, with stick-shift, Ram-jet engine. Exceptionally fast. Needs painting. Price \$150, or trade for '55 BSA or '52 Harley. Ed Marshall, H'way 15, Sparta, N.J.

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WHEN IN DOUBT — MEASURE

Dear Les,

I own a '50 Plymouth, and the 6 has just got to go. I have a chance to buy a '54 Buick mill coupled to a '38 Olds trans. Would it be much trouble to swap? What trouble would I have?

Paul Kosmo Norwich, Conn.

• This is typical of the letters we receive so I am answering it to satisfy other would-be letter writers. Regardless of the kind of engine swap you are contemplating, a regular carpenter's tape will do wonders. If you know what engine you want to use, measure its length and width and then measure the area you want to drop it into. It should be obvious whether it will fit or not. The distance between bellhousing bolts should be easy to figure also. In your case the trans is already on the engine and measuring with the tape should tell you if the drive line need be cut to fit the trans output shaft. When all calculations have been made, consult Rod & Custom advertisers to find motor mount, drive line and bellhousing adapters to fit almost all engine swaps.

SHOEHORNING A "348"

Dear Les,

I am planning to build a rod this summer and would like some experienced advice. Will the 348 cu. in. Chevy fit into a '55 Chevy without any torch work and if not, what would have to be done? Could you tell which motor mounts I could use if the stock engine was either a 6 or an 8? Will the '55 Chevy 3-speed bolt up to the 348? If a 4-speed Chevy trans replaced the stocker would there have to be any alterations? Would the engine cool properly with the stock radiator?

Les Bending North Platte, Neb.

• Yes, the 348 cu. in. Chev will fit into your '55 Chevy chassis with no cutting except for the exhaust system around the steering box. You are adding a lot of weight up front that will be a bit detrimental in the all-out go department though. A little mounting fabrication will have to be done but cardboard templates as patterns will let you use your existing mount stud holes. Either the

3-speed or the 4-speed will bolt to the 348 V8 but I think the 4-speed would make a better combination for you. The drive line will have to be reworked. This will no doubt be the biggest problem but a '57 Chevy 4-speed drive line should fit right in unless you change the relationship of the 348 engine position to the small V8 you are taking out. As long as your existing radiator is in good shape, you should have no problems with cooling, but make sure of this by having it reworked at your local radiator shop. Possibly a set of semi-competition shocks should be installed on your car to alleviate the new excessive weight up front.

BOW-TIE 'BOX SWAP

Dear Les,

I have a '57 Chevy V8 with a small 185 hp engine, a four-barrel carb and dual exhausts. The transmission is a Powerglide. How much of a job would it be to change to stick shift and put it on the floor? Would I have to spend a fortune doing it? Also, could I put in a 4-speed Corvette box, and would it be worth it with the engine I now have? I am planning to beef up the engine but it won't be anything drastic. Could I have some ideas on this, too?

Jeff Many Silver Springs, N. Y.

• You have picked a job that is not too hard to accomplish. Putting the shift arm on the floor will save time and money. The bellhousing and all the parts can be purchased at your local Chevy dealer and it should not be hard to find parts because Chevy shows a 4-speed trans for optional equipment for a '57 Chevy. If my budget could afford it, I would definitely install the 4-speed if only for its versatility. R&C shows advertisers who have floor shift conversions for sale and any one of them could fix you up if you decide to go to the 3-speed route. The only other suggestion I could give you is to be sure and spend your money wisely for a clutch. By all means use a heavy duty assembly such as Weber Torquemaster or a Schiefer assembly. Some clutches have a nasty habit of coming apart.

Dear Les,

I want to install a Monza engine in my '61 Renault Dauphine. Could you please tell me any troubles I would encounter with the mounts, transmission, engine room, etc. This is my first try at auto customizing and I would appreciate your help.

Jeff Anthony

Arlington, Va.

• I made some measurements and I am afraid the Monza engine will not fit in your Renault; it is about 4 inches too wide on each side and the trans hookup will be a lot of trouble. Any engine swap can be accomplished but this swap is impractical. I would make a few inquiries about oversized pistons and pos-

sibly a crankshaft stroke for the Renault. A little ingenuity could pay off big in performance; or try a Judson blower to place on your little mill. Timed properly, you could show the Corvairs and Falcons the way home.

FLATHEAD OR OVERHEAD?

Dear Les,

I have a '48 Ford coupe with a V8 flathead. How can I put in a '55 Chevy (small) V8 engine, or, can you give me advice on fixing up the original engine? Steve Harris Houston, Tex.

• The flathead engine is still satisfactory to really run but at its best it will be tough going to stay even with the small V8 overheads. I think putting a Chevy V8 in is good, with a minimum of machine work. Check our advertisers for a bellhousing adapter to bolt your trans up to a Chevy V8, and the motor mounts will also be a minimum of work. The only real problem is hooking up a good muffler system but most muffler shops can accomplish this.

OR ELSE TAKE OFF THE PAN!

Dear Les,

Is it possible to install a 352 Ford engine in a '41 Ford coupe? I know the oil pan will not clear the cross member for one thing. I planned to cut the oil pan, but since the oil pump is in the front I don't think I can.

Richard Kern Lancaster County, Pa.

• I hope you have not spent a lot of money on the 352 cu. in. engine because it won't fit unless you guesst the cross member and set the engine back farther which is a lot more trouble than it is worth. I think the best answer is to trade it for a good '57 TBird 318 cu. in. engine and use a pickup truck pan assembly for the passenger car. This engine will bolt right in and all you will need is a good muffler system and one of those C&T Automotive universal mounts for the front. "Drive on, James."

STICK TO SIX

Dear Les,

I have a '42 Plymouth coupe and the stock engine is short on power for mountain climbing. Could you tell me what V8 would fit easiest to the standard trans and what would I have to do to make this conversion? If a V8 is impractical, what about a later model Chrysler Corp. "6"?

Newel Egger

Soulsbyville, Calif.

• A V8 is impractical from the standpoint of both work and cost. On the other hand a 6 cyl. will bolt right in. Some measurements should be made first but a '61 Dodge or Plymouth will bolt in with a minimum of work and probably would show a big increase in performance. This also would retain a lot more resale value when it's car-sell time.

FORECAST FOR '62

Rumors continue about double-overhead-camshaft cylinder heads being developed for Ford's new 221-cubic-inch V-8. One report said prototypes have been revved 8500 rpm for several hours on the dyno--and all-out performance versions have developed over 350 hp at 7500 rpm from the stock 221-inch block! If such heads ever become available it is certain they will be produced by a small outside "vendor" in limited quantities, and will probably be very expensive.

Look for the Corvette lightweight aluminum radiator to be used on some '62 Chevy passenger cars. Experiments are showing it to be very durable, dependable and efficient--and GM's Harrison Radiator division is getting the cost down to attractive levels. It will likely be standard on the Super Sports models, where less front end weight helps drag strip performance. The complete radiator with header tank and brackets weighs only 14 pounds.

Look for Buick to hit the performance trail next year. Somewhat disappointing sales, even with the new special compact lines, push Buick brass into trying anything that might pep things up. The '62 performance program will concentrate on the Special (though the big cars will also offer new performance options). Word is that Buick engineers are developing four Special coupes to be campaigned by selected dealers on West Coast drag strips this winter. They are said to feature hotter solid-lifter cams, extra carburetion and compression, special exhaust headers, Borg-Warner four-speed transmissions and special rear end gears. Drag strip trap speed is said to be 90-95 mph with ET's in the high 15's! All this special equipment would likely be declared "stock" by December 10th to be eligible for Daytona.

Ford's four-speed floor-shift transmission option for '62 will utilize the same basic unit as used by Chevrolet, Pontiac and Studebaker. This is essentially the heavy-duty Borg-Warner three-speed box with special gearset and reverse gear in the tail housing. The main gearcase and internal gearsets will be the same on all lines, with each having its own tail housing for mounting and shift linkage. This is the only way four-speeds are possible in our industry. Volume is too low to justify tooling a complete new transmission design.

The prototype chassis for the "all-new" Corvette is on the road right now. Chevy engineer Zora Arkus-Duntov is driving it around the streets of Detroit--under a standard '61 fibreglass Corvette body. It has link-type independent rear suspension on coil springs, conventional coil spring front end, and is said to have a tubular space-type frame. Engine is the 327-cubic-inch '62 model.

Pontiac engineers are getting terrific performance out of the 195-cubic-inch Tempest Four power packs for 1962. The hottest is said to dyno at 210 hp, give 0-60 mph times near seven seconds and top speeds over 120 mph. New solid-lifter cams, compression, carburetion and exhaust headers are featured. Inch-for-inch, the Tempest Four may have more potential than the big Pontiac V-8.

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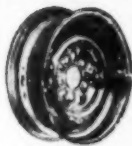
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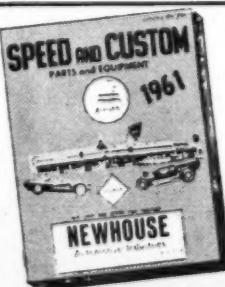
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VOLKSWAGEN OWNER'S HANDBOOK 1961 REVISED EDITION NO. 3

"What the first two editions of this complete Owner's Handbook have meant to VW drivers in the past will certainly be equaled by this new Floyd Clymer publication," says a well known Volkswagen expert, "indispensable to the owner who wants to keep his VW in top operating condition, to extract its gas mileage potential and avoid needless expensive repair bills caused by neglect. Clymer's Revised Edition No. 3 of this best seller covers the car from stem to stern and includes ALL DETAILS OF THE 1961 and previous models. Specifically revised to illustrate the new carburetor . . . the automatic choke . . . the synchro-first transmission and the improved engine, plus carburetor jet data and tune up specifications. Edition No. 3 contains 207 pages crammed with information of importance to the driver and/or the enthusiast. Hundreds of illustrations on step-by-step methods employed to effect repairs and maintenance and the distilled experience of service people in layman's language combine to give the VW owner an understanding of his vehicle which will be invaluable. No. 3 is the nearest thing to the Volkswagen Shop Manual—which Volkswagen supplies only to authorized dealers. Far more comprehensive than the Owner's Manual, this book gives much information never before included in any publication. Clymer books on the VW are considered the 'bible' of the average VW owner. Clymer is by far the largest publisher of books dealing with VW and his books are guides for thousands of owners, dealers, mechanics, and garagemen the world over."

No. 3 gives much information on the Transporter commercial vehicle—however, the owner of a VW Transporter in any model should order the new Volkswagen Owner's Transporter Handbook. Prices at \$3.00, this Transporter book covers all VW commercial vehicles of 1961 and all previous models. Price of the new No. 3 is.....Postpaid \$3.00

"HOW TO RESTORE THE MODEL A FORD" IS INTRIGUING NEW BOOK

If you have had the desire to embark on a restoration project of any sort but have been deterred by the involved search to unearth the original specifications which must precede such a pastime, you will appreciate the latest publication to be issued by Floyd Clymer. Whether or not you own a Model A Ford or contemplate the purchase of one for any purpose, the book, HOW TO RESTORE THE MODEL A FORD is a most intriguing volume. It contains exact specifications of all Model A's, from 1927 to 1931, all models including station wagons, the dates on which innovations and changes were made in the model year, reprints of Ford Shop Service Bulletins showing procedures and methods, paint charts and formulas, an upholstery guide, wiring diagrams, parts numbering systems and every conceivable detail the Model A fancier would require as a guide to complete restoration of minor repairs.

The 144-page volume is crammed with diagrams, photographs, charts and drawings. It represents a not otherwise available source of information on each facet of Henry's Fabulous A. An owners', collectors' or enthusiasts' dream.....Postpaid \$3.00

NEW CATALOG OF ALL JAPANESE MOTOR VEHICLES

The industrial resurgence of Japan following the Pacific War has been an amazing accomplishment. The nation's entry into the automobile, motor scooter and motorcycle market has been almost as amazing. In view of the fact that the island has so few highways worthy of the name, the tremendous number and variety of motor vehicles being built by Japanese enterprise is something to view with interest. Export is obviously the answer and Japan is about to make a determined bid for automobile, truck, motorcycle, scooter and moped sales in the world marketplace. Japan now builds more makes of cars and trucks than any other country. They now lead in motorcycle production.

The offerings of Japanese industry are varied and highly commendable technically. They are completely illustrated and described with full statistical information in a new 264-page catalog of large 8½" x 11" size, being made available by Floyd Clymer Publications. The catalog not only covers every motorized wheeled vehicle produced in Japan, it incorporates stories about the Japanese auto industry, the country itself and is illustrated with over 600 photos. Any motorcyclist who may have seen a Honda, Yamaha or Suzuki, or any motorist who has seen the Toyopet or Datsun will be amazed at the wide variety of vehicles we have not been exposed to until recently. The catalog is a revelation and should be in the hands of everyone who is interested in either motor vehicles or international trade. It is indeed a collector's and automotive enthusiasts' dream.....Postpaid \$5.00

MODERN FLIGHT

The author of this 290 page book on flight training is Floyd P. Clevenger, dean of all flight instructors. A veteran of 41 years flying—over 20,000 hours—as transport pilot, chief test pilot, student instructor, skywriter and outstanding acrobatic pilot. This is actually FOUR BOOKS IN ONE. It includes basic training, acrobatics, multi-engine and instrument flying. A thorough summary of all phases of flying by a specialist in the analysis and teaching of precision flying. Any student, pilot or enthusiast will gain priceless information from these words of wisdom. Postpaid \$3.00

ENGINE SWAPPING

Here is a newly revised "How-to-do-it" book about engine swapping. Covers late model OHV engines with step-by-step method of installing into older cars and compacts. Information on installing Cadillac into Ford, Chevrolet into Ford, Chrysler into Ford and Chevrolet into Studebaker and late Chevrolet into early Chevrolet and others. All electrical circuit changes. Information on adapters, engine weights, suspension and chassis data. A MUST book for the enthusiast who wants to change engines and other parts. Lots of photos.....Postpaid \$2.00

SOUPING THE VOLKSWAGEN

Here is a brand new fully illustrated how-to-do-it book by VW authority-engineer G. R. Morgan. It gives full information on increasing power, speed and acceleration in the Volkswagen engine. It covers all details about high compression, pistons and heads, camshafts, carburetion, supercharging, exhaust systems, timing and general information necessary for souping the Volkswagen. Charts show the increase in efficiency and power obtained by each souping operation. Thus the owner may decide the steps best suited to his requirements and his pocketbook. Included are sections on trouble shooting, tune-up, and hints and tips on driving the VW. There are dozens of charts and drawings, information on VW model changes, and hundreds of things every VW owner should know.....Postpaid \$3.00

HOW TO DRIVE THE VOLKSWAGEN AND CLYMER ROAD TEST

This unique book gives hints and tips on the technique of getting the very best performance from the Volkswagen. How to handle a rear engine car, proper shifting of gears, cornering, braking, economy, and other valuable tips. It also covers the road tests over German highway, side roads and Autobahns, as well as road tests in the U.S., and Clymer's comments about his visit to the VW factory and his interview with Dr. Heinz Nordhoff. Also included in this 224 page book is a wealth of material on picking up a VW in Europe, touring the continent, and bringing the car home at a tidy saving. It gives details on where and how to pick up the car in any one of several European countries, the exact cost, insurance rates, transportation figures and what documents are necessary. There are many photos of the VW factory and colorful Germany with suggested tours of scenic spots.....Postpaid \$3.00

SIMCA OWNER'S HANDBOOK AND CLYMER'S ROAD TEST

This complete service manual on Simca give information that every owner, prospective owner and enthusiast will want to know about Chrysler's famous French import, the Simca. Covers all models, with specific information on care and maintenance. Also includes Clymer's road test of the new 1960 Simca Elysee model. Tests include Clymer's drive from Detroit to Los Angeles, and one day results of testing the car up 14,100 ft. altitude Pikes Peak, in Colorado. Read the good and the bad features about Simca by Clymer.....Postpaid \$4.00

RENAULT DAUPHINE OWNER'S HANDBOOK AND ROAD TEST

Here is a large complete owners handbook needed by every owner of the Renault Dauphine. Tells the owner how to perform service operations and keep his car in top condition. Written so the layman can understand it. In addition to the technical section the book includes Floyd Clymer's test report with many photos and comments on the car's behavior. Also Clymer's comments on manufacturing methods of Renault he saw on his visit to the factory in France.

This book also includes a few sections by the famous Belgian racing driver, Paul Frere. There are also beautiful photographs of the Renault factory, including manufacturing methods and assembly line procedure.....Postpaid \$3.00

FORD MODEL "A" ALBUM

This big unique book is actually a pictorial history of the fabulous model "A", including trucks. 150 splendid 4 x 7 photos illustrate all of the "A" models from various angles. Each photo has captioned details and comments by the outstanding model "A" authority, Leslie R. Henry. Included are interesting sales and promotion articles, technical articles and servicing data by experts, specifications, listing of motor numbers for each month, description and photos of prominent characteristics of each yearly model. And 24 pages illustrate and describe accessories of all kinds. There is also an interesting article on the Ford-built Lincoln. This most comprehensive volume has 144 large pages which will delight any "A" owner, collector or enthusiast.....Postpaid \$3.00

FILL 'ER UP

Fifty years of motoring as told by Bellamy Partridge, famous author of thirty other books on Americana. Includes chapters on crackpots, the Chicago Race, get a horse, years of guesswork, first Auto Show, the A.A.A., speed, the Glidden Tour and Vanderbilt Cup, Lincoln Highway, out of the mud, chronology of the motor car from 1893 to 1952. Famous pioneers, drivers and manufacturers. Interesting photos. First printed by McGraw-Hill Book Co., we now reprint it by popular request. Truly a great book of Americana by a great author who wrote Excuse My Dust, Horse and Bugy, Roosevelt Family, Get a Horse, Country Lawyer, Big Freeze, Old Oaken Bucket, Salad Days, and twenty-five other classics of Americana. 288 pages and a thrill on every one.....Postpaid \$3.00

1960 INDIANAPOLIS YEARBOOK

The most complete Indianapolis book ever . . . 136 action-filled pages . . . over 450 photos, charts, diagrams, drawings (more than ever before) . . . Pre-Race and Race Time articles by famous writers . . . daily comments during the month of May . . . minute-by-minute coverage of the Race . . . Race graphs showing every car's position every lap . . . comprehensive pit stops reports . . . color and detailed description of each car . . . press box bulletins . . . biographies of every car and driver . . . photos of all drivers and crews . . . technical articles on Offenhauser engines, magneto, fuels, tires, wheels, etc. . . complete entry list and reasons for failures . . . all track records and money earnings . . . rookie driver qualifications . . . 100 Mile An Hour and Victory banquets . . . photo and story coverage of pre-Race Festival activities in detail . . . by far the best Indianapolis book we have ever published!.....Postpaid \$2.00

PORSCHE OWNER'S HANDBOOK

This handbook, the first of its kind to be published, is almost a shop manual in its thoroughness and complete exposition of repair technique. THE PORSCHE OWNER'S HANDBOOK explains the why of care, tuning, and repair so that the owner will have a better understanding and can diagnose or treat according to his ability.

In addition, the author, O.Cee Ritch, veteran technical writer and competition driver, has included the speed secrets that made the hottest Porsches go. In a special section he details proven modifications for those interested in super performance. Covered are all Porsche models from 1100 to Super 90, plus the 1500-1600 Carreras; engine, chassis, suspension, etc. Photos of all models, with charts and drawings.

Written with authority, this handbook should be in every Porsche owner's glove compartment and in the hands of every Porsche enthusiast and tuneup expert. Valuable for prospective owners and collectors. Fully illustrated with hundreds of photos, charts and drawings, the handbook is far more valuable than its nominal purchase price indicates. Postpaid \$4.00

FERRARI OWNER'S HANDBOOK

This beautifully illustrated manual presents a score of never-published photos, charts and cutaways from the Ferrari Factory files among hundreds of illustrations. Complete specifications and data on the outstanding Ferrari Grand Prix, Touring and Sports models plus tuning and repair data that the average enthusiast and owner can understand. Hans Tanner, well known European correspondent has dug deep into factory material to compile this highly interesting volume that will appeal to all car fanciers as well as providing an heretofore unavailable source of information for the owner. Forward by Luigi Chinetti. Completed in 167 pages.....Postpaid \$4.00

MASERATI OWNER'S HANDBOOK

The first complete listing and compilation of specifications and data on Maserati Formula, Sports and Touring cars ever printed. Photos of Wilbur Shaw and his 500 mile race winning Maserati. Expert Hans Tanner, whose intimate acquaintance with factory officials has given him access to heretofore unpublished material, has included dozens of charts, photos, graphs and drawings in the hundreds of superb illustrations along with tuning and repair data on the most popular models. A racing history of Maserati from the inception of the marque to the present is also included. Fascinating, informative and complete, this 160 page manual should be of interest to every automobile enthusiast as well as Maserati owner.....Postpaid \$4.00

100 OF THE WORLD'S FINEST CARS

This is one of the most unique and fascinating books we have been privileged to publish in the past 20 years. The authors, three Frenchmen, are among the most informed auto historians in the world. We knew that any selection of any number of the "Finest" would be a matter of great critical comment but we feel that the authors have made one of the most interesting compilations possible. There are names and descriptions of cars almost unheard of: Beverly-Barnes, Omega, Elzalde, Diana, Ruxton, Triumph Delomite, Rochet-Schneider sprinkled among the familiar Duesenbergs, Cord, Rolls Royce and Mercedes that we are accustomed to seeing in classic lists. We know that you will spend more than a hundred happy hours learning about 100 of the World's Finest Cars in this big 8½" x 11" volume. The hundreds of photographs, drawings and advertisements used to illustrate the book add to its nostalgic interest inasmuch as they date from the time the cars themselves were popular. Most of these illustrations have never been published in the United States. This is truly an exceptional book that should be in the hands of every automobile enthusiast and collector.....Postpaid \$4.00

BRITISH FORD OWNER'S HANDBOOK

Actually this is two books combined into one. It covers full service information care and maintenance of Prefect, Anglia, Consul, Zephyr and Zodiac, all British Ford models, now sold by Ford dealers and many imported car dealers in the United States. Includes Clymer's Ford Anglia road test and comments. Postpaid \$3.00

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